Registered at the G.P.O. for Transmission to Canada and Newfoundland by Magazine Post.

VOL. 31. Ser. A. Part 9. pp. 353–392. SEPTEMBER, 1943.

THE REVIEW OF APPLIED ENTOMOLOGY.

SERIES A: AGRICULTURAL.

ISSUED BY THE IMPERIAL INSTITUTE OF ENTOMOLOGY.

LONDON:
THE IMPERIAL INSTITUTE OF ENTOMOLOGY,
41, QUEEN'S GATE, S.W.7.

Price 3s. net.

IMPERIAL INSTITUTE OF ENTOMOLOGY.

Executive Council.

SHAMALDHARI LALL, C.I.E., Officiating High Commissioner, *Chairman*, India and Burma.

Sir DONALD FERGUSSON, K.C.B., United Kingdom.

Lieutenant-Colonel J. G. ROBERTSON, Canada.

F. L. McDOUGALL, C.M.G., Australia.

F. J. DU TOIT, Union of South Africa.

A. L. POOLE (*acting*), New Zealand.

J. M. ADAMS, F.R.C.Sc.(I), Eire.

D. JAMES DAVIES, C.B.E., Newfoundland.

W. C. ROBERTSON, Southern Rhodesia.

G. H. CREASY, C.M.G., O.B.E., Colonies, Protectorates and Mandated Territories.

Sir DAVID CHADWICK, K.C.M.G., C.S.I., C.I.E., *Secretary*.

Director and Editor.

Dr. S. A. NEAVE, C.M.G., O.B.E.

Head Office—British Museum (Natural History), Cromwell Road, London, S.W.7.

Publication Office and Library—41, Queen's Gate, London, S.W.7.

Director, Imperial Parasite Service.

DR. W. R. THOMPSON, F.R.S.,

228, Dundas Street, Belleville, Ontario, Canada,

SMEE (C.). **Report of the Entomologist, 1942.**—7 pp. typescript. [Zomba] Dep. Agric. Nyasaland, 1943.

There were few serious outbreaks of insect pests in Nyasaland in 1942. Only two of 450 larvae of Lepidoptera other than *Diparopsis castanea*, Hmps., collected on cotton in a large number of gardens, were those of *Platyedra gossypiella*, Saund. [*cf. R.A.E.*, A **30** 502, etc.], and only two pupae and ten larvae of this moth, of which eight were dead, were found in an extensive examination of seed-cotton in ginneries, no double seeds containing larvae in diapause being observed. It is therefore concluded that under local conditions, and provided that the dead season between crops is rigorously enforced, *P. gossypiella* may be a minor pest of cotton as compared with *D. castanea* and *Dysdercus* spp. The restriction on the import of cotton lint from Nyasaland into the Union of South Africa, on account of the presence of *P. gossypiella*, was removed at the end of the year for saw-ginned baled lint of high density that had been harvested for more than four months. Further investigations of the wild food-plants of *Myzus persicae*, Sulz., which infests tobacco [*cf.* **31** 233], indicated that this Aphid does not occur on *Cleome monophylla* until the middle of January, when tobacco is usually already infested. *Pheidole megacephala*, F., removed seeds in tobacco nurseries in the Zomba and Palombe areas, but was successfully controlled by means of pyrethrum powder.

In March, hatching of *Niphadolepis alianta*, Karsch, on tea [*cf.* **30** 502] was extremely heavy in Cholo, on the estates that were first infested, but there was less damage by the end of June than was anticipated, in spite of the large numbers of larvae and cocoons that were observed. The outbreak was very localised, and some areas were comparatively free from infestation, whereas in others the bushes were almost completely defoliated by the end of August. Damage to the leaves of tea by the Rutelid, *Popillia browni*, Kolbe, was reported from one area of Mlanje in February. The spread of *Pseudococcus adonidum*, L., on tung trees [*Aleurites*] was less rapid than had been expected [*cf.* **30** 503] ; vigorous trees showed little or no infestation, and even those that were most severely attacked produced some nuts. *Chilo suppressalis*, Wlk., and *Proceras* (*Diatraea*) *argyrolepidus*, Hmps., of which the former was the more numerous, caused rather serious damage to sorghum in the Lower Shire and Chikwawa districts ; outbreaks of these stem-borers are associated with years of low rainfall. Parasitism was negligible, and burning of old sorghum stalks, which are usually employed as building material, was encouraged. Owing, however, to the presence of ratoon plants and sugar-cane, the borers probably have adequate food to carry them over the period between crops, though they have not yet been found in sugar-cane.

A widespread outbreak of *Laphygma exempta*, Wlk., in the Southern Province in April did considerable damage to wheat and other cereals. Liberal dusting with pyrethrum powder was very effective in small areas. An undetermined species of *Entedon* that was reared from *Apion* sp. damaging cowpeas in the field in May was itself parasitised by *Pleurotropis africana*, Wtstn. Dried cassava in store was attacked by Coleopterous borers, including *Heterobostrychus brunneus*, Murray, *Bostrychoplites cornutus*, Ol., *Lasioderma serricorne*, F., a species of *Lyctus*, possibly *L. brunneus*, Steph., and undetermined Scolytids ; the predacious Clerid, *Tarsostenus univittatus*, Rossi, was bred from the same material.

Roots of pine seedlings in the Dedza district were attacked by Melolonthid larvae, and a Cerambycid, possibly a species of *Taurotagus*, and a large Ichneumonid were reared from *Acacia karroo* from which gum was being collected. Larvae of a Notodontid of the genus *Rhenea*, possibly *R. mediata*, Wlk., completely defoliated two large trees of *Trichilia emetica* at Zomba.

Nomadacris septemfasciata, Serv., which was again the only locust observed in the Protectorate [*cf.* **30** 503] was mainly confined to the Southern Province. With the exception of a small, scattered band found at the end of January on

(1266) Wt. P11/3728 1,500 9/43 S.E.R.Ltd: Gp. 432. [A]

the west of Lake Chilwa, hoppers from eggs laid at the end of 1941 were reported only from the Lower Shire and Chikwawa districts, and as a result of poison spraying and beating, many were destroyed by the end of March, and damage was reported from about 50 gardens only. Adults developed at the end of March and during April, and the usual movement of flying swarms occurred. A large swarm travelling towards the south-west was seen at Nathenje at the end of April, and a few flights were reported during May ; a little damage was done to cotton and sorghum in one area. Some large swarms appeared in September and October, among which there was a fairly definite northerly trend along the Shire river in the Blantyre district and some circling flights occurred near Ncheu, but no swarms were reported from any other district in the Northern Province. Activity decreased in November and December, but slight damage was caused to early maize. One large swarm appeared in January 1943 on the boundary between the Ncheu and Upper Shire districts, where eggs were laid. Egg-laying occurred first about 13th–15th November in the Lower Shire district, where hoppers hatched a month later, but were controlled by spraying before they damaged crops appreciably, and later over scattered areas. No serious damage or large bands of hoppers were reported by the end of the year.

WILSON (H. F.) & CAMPAU (E. J.). **Thiocyanate Compounds for Pea Aphid Control.**—*Soap* **19** no. 2 pp. 105, 107 & 109. New York, N.Y., 1943.

The results are given of field and greenhouse experiments in the United States in 1941 and 1942, which showed that the control of the pea Aphid [*Macrosiphum onobrychis*, Boy.] by means of cubé dusts was improved in some cases by the addition of proprietary thiocyanates.

MACLEOD (G. F.) & SMITH (L. M.). **Deposits of insecticidal Dusts and Diluents on charged Plates.**—*J. agric. Res.* **66** no. 2 pp. 87–95, 4 figs. Washington, D.C., 1943.

Preliminary tests on avocado leaves having shown the importance of the relation of the electrical charges produced on dust particles by friction to the deposition and adhesion of insecticides, an apparatus for measuring the deposits of dusts on positively and negatively charged plates was constructed, and this and methods of using it and interpreting the results obtained are described. It was found that, in general, powders of plant origin gave heavier deposits on the negatively charged plate, and diatomites and clays on the positively charged one ; the distribution of other substances varied according to their composition. The material of which the outlet tube was constructed influenced the ratio of the deposits on the negative and positive plates, and increasing its length increased the inequality between deposits on the two plates up to a maximum beyond which no change was observed. Increasing the feeder opening reduced the inequality between deposits of a bentonite clay. The addition of 1 per cent. of one powder to another increased the inequality between deposits in four of eight cases studied, but the deposits that would result from a mixture of two powders could not be predicted from a study of each of the component materials.

WEBSTER (R. L.) & others. **Division of Entomology.**—*Bull. Wash. agric. Exp. Sta.* no. 425 (52nd Rep. 1941–42) pp. 35–41. Pullman, Wash., 1942.

In tests of sprays against the codling moth [*Cydia pomonella*, L.] on apple in Washington in 1942, cryolite in a light medium spray oil gave control equal to that from lead arsenate in similar combinations, and the lower grades were as satisfactory as higher ones. As in 1941 [*R.A.E.*, A **31** 93], micronised phenothiazine was very effective, but its use throughout the season spoiled the colour of the fruit, and Genicide (xanthone), which gave control approximating to that

from lead arsenate and oil, caused calyx injury. Commercial fixed nicotine applied in cover sprays with lead arsenate was generally ineffective. Very light spray oils were found in laboratory experiments to be of considerable value against eggs of *C. pomonella*, though less effective than those usually employed, the viscosity of which is between 50 and 60 seconds Saybolt. One with a viscosity of 46 secs. and an unsulphonatable residue of 88 per cent., applied at concentrations of 0·5 and 0·75 per cent., killed averages of 79·7 and 89·6 per cent. of the eggs, with maximum variations of 40 and 24 per cent., respectively.

In 1942, damage by the Pacific mite [*Tetranychus pacificus*, McG.] did not become severe in apple orchards until late in the season; in some, it was checked by natural enemies, notably Coccinellids of the genus *Stethorus*, but in others heavy spraying was necessary in late July. The pear psylla [*Psylla pyricola*, Först.] was not found in any additional areas during the year, but signs of infestation were observed in fresh localities in the Okanogan Valley; following its discovery in British Columbia [*cf.* **31** 270], sprays were applied to all pear trees in a zone about 8 miles wide immediately south of the international boundary.

The area under tomatos was increased in 1942 but little damage by the tomato fruit worm [*Heliothis armigera*, Hb.] occurred, and it is thought that regular control will be unnecessary in eastern Washington. Infestation on sweet maize was also considerably lower than usual, and in early crops reached only 2 per cent., though in untreated main crops it was as high as 90 per cent. at harvest. In experiments on control by mineral oil injected into the ears, 85 per cent. of the treated ears were uninfested when pyrethrum extract to give 0·2–0·3 per cent. pyrethrins was included in the final mixture. The best results followed a single application at the rate of 0·75 cc. per ear, applied on the surface of the silks or injected about ½ in. inside the ear. Control was not affected by delaying the treatment until a week after the appearance of the silks, when they become brown, but the tip kernels remained undeveloped along a fifth of the ear whenever oil was applied. Dusting the fresh silks 2–3 times with cryolite and pyrophyllite (1 : 1) or calcium arsenate gave 53–77 per cent. control and did not injure the tips.

The numbers of *Crioceris asparagi*, L., on asparagus were lower than for several years, and all treatments applied after the flowering period were effective against both larvae and adults. A dust of 10 per cent. calcium arsenate in pyrophyllite was cheap and effective; comparable results were given by others containing 0·5, 0·75, or 1 per cent. rotenone [**31** 93]. Cryolite, pyrethrum dusts and lead-arsenate sprays were rather slower in action than calcium arsenate dusts. Danger to honey bees was avoided by applying insecticides after the peak flowering period, which gave effective control of the beetles before the plants were appreciably injured, although flowering was late. Potato tubers in eastern Washington are attacked by the larvae of flea-beetles [*Epitrix*] in June, when little damage usually follows, and again in July and early September. In 1941 and 1942 peak populations occurred in the last third of July and first third of September, both common species [**31** 93] being involved. Heavy populations occurred where successive plantings were made from March until early July. Satisfactory control was given by 4–6 applications of calcium arsenate or cryolite dust; a mixed dust of rotenone and cryolite was more rapid in action, but the cost is high. A rate of 8–10 lb. dust per acre is adequate for small plants, and 35 lb. for medium and large ones.

The large acreage under edible peas for drying and Austrian winter peas in 1942 greatly increased the potential food-supply of the pea Bruchid [*Bruchus pisorum*, L.]. Rotenone dusts applied to peas for drying when they come into flower do not give complete control, and fumigation of the harvested crop is therefore necessary; the use of rotenone on Austrian peas grown for seed is prohibited in order to conserve the supplies of rotenone for crops used as human food and fumigation is compulsory. Infestation of cabbage by *Ceuthorrhynchus*

assimilis, Payk., in experimental plots in western Washington was reduced by approximately 20 per cent. by two applications in May of a dust containing powdered derris root, hard wheat flour, talc and a wetting agent ; populations were still high on both treated and untreated plots, however, and the results are not considered conclusive.

Investigations were begun in 1942 on *Sitona lineata*, L., a European weevil that attacks leguminous plants and has recently become established in the San Juan Archipelago and several places on the mainland. It was most abundant and injurious on San Juan Island. Most of the damage by the adults occurred on autumn-sown common vetch [*Vicia sativa*] ; it was attacked both by the overwintered weevils and by adults of the first generation, which emerged in late June. A field of purple vetch [*V. atropurpurea*] that was almost defoliated in May recovered sufficiently to produce a fair crop. Populations were much lower on vetch sown in spring, probably because the autumn-sown vetch is available early in spring for oviposition. Adults were observed entering the sacks at threshing time, and all vetch seed produced within the infested area should therefore be fumigated. Comparatively few weevils were present in the field after the vetch was dead, but no large-scale migration to lucerne or clover was observed. *Cydia* (*Laspeyresia*) *nigricana*, Steph., was common on vetch, especially on Lopez Island, and is reported to have been more injurious to peas and vetch during 1942 than *S. lineata*.

SINGLETON (H. P.) & others. **Irrigation Branch Experiment Station.**—*Bull. Wash. agric. Exp. Sta.* no. 425 (52nd Rep. 1941–42) pp. 86–96. Pullman, Wash., 1942.

In a section dealing with investigations on the control of wireworms [*Pheletes* spp.] in irrigated land in eastern Washington (p. 93), M. C. Lane and K. E. Gibson report that during studies on crop rotation over a period of seven years, lucerne caused the greatest reduction in wireworm populations, especially after 3–4 years. Damage to potatoes was about 50 per cent. less when they followed lucerne than when they followed sweet clover [*Melilotus*], sugar-beet, maize or wheat, all of which support 2–5 times as many wireworms as lucerne after 3–4 years. The rotation at present recommended to avoid damage is four years under lucerne, which should be kept as dry as possible during April, May and early June [*R.A.E.*, A **30** 175, 176], followed by three years under potatoes, maize, sugar-beet or wheat.

Almost complete mortality was obtained in 1942 when crude naphthalene was applied on light sandy loams at the rate of 300 lb. per acre, 150 lb. being broadcast on the surface and disk-harrowed in before ploughing and the rest broadcast on the surface and disked in after ploughing. Control varies directly with the fineness of the naphthalene and the thoroughness with which it is incorporated in the top 10–12 ins. of ploughed soil. On heavier soils, a rate of 500 lb. per acre would probably be more satisfactory.

CROWLEY (D. J.). **Cranberry-Blueberry Laboratory.**—*Bull. Wash. agric. Exp. Sta.* no. 425 (52nd Rep. 1941–42) pp. 100–102. Pullman, Wash., 1942.

In experiments in Washington in 1941 and 1942, combinations of oil and lime-sulphur were found to be safe and economical substitutes for concentrated solutions of lime-sulphur in the control of San José scale [*Aspidiotus perniciosus*, Comst.] and Putnam's scale [*Aspidiotus ancylus*, Putn.] on cranberry [*cf. R.A.E.*, A **31** 95]. Combinations of oil and dinitro-ortho-cresol applied as dormant sprays against *A. perniciosus* and the oyster-shell scale [*Lepidosaphes ulmi*, L.] did not give satisfactory control, and injured the leaves and fruit-buds. In tests to discover substitutes for rotenone and pyrethrum in summer sprays against the cranberry fireworm [*Rhopobota naevana*, Hb.] and the cranberry

fruitworm [*Mineola vaccinii*, Ril.], a proprietary thiocyanate (Loro) was effective against the former at a dilution of 1 : 400, but injured the flowers and young shoots when used more than twice in succession ; no injury occurred when it was alternated with other sprays. Cryolite and lead arsenate, both with oil, were each more effective in combination with rotenone than when used alone. A spray containing phenothiazine (2½ lb. per 100 U.S. gals.) and kerosene gave good control of *M. vaccinii*, but caused an irritant rash on some operators when applied on windy days. Nicotine bentonite was less effective against *R. naevana* than nicotine sulphate, but more effective against *M. vaccinii*, probably owing to a repellent action, since the residue persists on the plants for a considerable time. None of the materials investigated, which also included magnesium arsenate with oil, was as effective as a spray of pyrethrum and rotenone. This spray is applied at the rate of 500 U.S. gals. per acre when the plants are in full bloom and again when half the flowers have fallen ; the high rate is rendered necessary by the tendency for adults of *M. vaccinii* to shelter in the vines during the day.

FOTEDAR (M. R.) & KAPUR (A. P.). **First Record of the sexual Forms and oviparous Reproduction of Woolly-aphis, *Eriosoma lanigerum* Hausm. from Kashmir, India.**—*Curr. Sci.* **12** no. 3 pp. 84–85, 1 ref. Bangalore, 1943.

Eriosoma lanigerum, Hsm., occurs on apple trees in all parts of India in which they are grown, but has not been recorded as reproducing sexually there. In Kashmir, alates are produced in May–July and August–November. Those that appear in May–July are not numerous, survive for 5–6 days, spread the infestation by their flight, and give rise to normal apterous nymphs by asexual reproduction. The alates that appear later occur in large numbers for about two months. They live for about six days and produce 4–7 nymphs each. These nymphs are of both sexes and have no mouth-parts ; the males live for 12 and the females for about 20 days. Both moult four times at intervals of 3–4 days. The female deposits an egg near the crown of the root of the apple tree and dies in the process.

PRUTHI (H. S.). **Report of the Imperial Entomologist.**—*Sci. Rep. agric. Res. Inst. New Delhi* ***1940–41*** pp. 57–63. Delhi, 1942.

Investigations at New Delhi in 1940–41 showed that the larvae of *Platyedra gossypiella*, Saund., in cotton seeds, resist higher temperatures under dry conditions than under humid ones, exposure of the seeds for 24 hours to 45°C. [113°F.] killing all the larvae if the saturation deficiency of the air is 3–14 mm., but not if it is 32 mm. After a shower, exposure to the sun for nine hours in May did not prove completely effective, whereas under good conditions of heat transmission, exposure for only 30 minutes in March sometimes gave complete mortality. The viability of cotton seeds was not materially affected by exposures of 20 minutes to 65°C. [149°F.] or 7 minutes to 80°C. [176°F.].

In further investigations [*cf. R.A.E.*, A **30** 317], it was found that *Bemisia tabaci*, Gennadius, could transmit tobacco leaf-curl [*Ruga tabaci* of Holmes] to healthy tobacco after feeding for 45 minutes on infected *Ageratum* [*conyzoides*], and individuals that had fed on infected tobacco for 15 minutes remained able to transmit the virus almost throughout their life. There was again a distinct correlation between the incidence of the disease and the population of the Aleurodid.

Insects observed for the first time on economic plants in or near Delhi included *Theretra alecto*, L., on grape vine, *Celerio lineata*, F., on *Thevetia neriifolia*, *Anticarsia irrorata*, Boisd., on mungo bean (*Phaseolus mungo*) and cowpea, *Taragama siva*, Lef., on guava, *Sphenoptera lafertei*, Thoms., on peach, and *Arcyophora dentula*, Led., on pomegranate. The commonest Aphids found there

were *Rhopalosiphum pseudobrassicae*, Davis, on crucifers, *Myzus persicae*, Sulz., on potato and tobacco, *Aphis maidis*, Fitch, on maize and sorghum, and *A. laburni*, Kalt., on leguminous plants.

Chilomenes sexmaculata, F., a common predator on Aphids in Delhi, preferred *Macrosiphum avenae*, L. (*granarium*, Kby.) to any other species; a species of *Tetrastichus* was reared from the larvae and pupae of this Coccinellid. Parasites identified during the year included the Ichneumonid, *Mesochorus facialis*, Bridgm., which was reared, probably as a hyperparasite, from a larva of *Sphenarches caffer*, Zell., that was also parasitised by *Apanteles paludicolae*, Cam.; *Litomastix gopimohani*,* Mani, from larvae of *Anomis* (*Cosmophila*) *sabulifera*, Gn., on jute at Dacca; *Euplectrus plecopterae*,* Mani, from *Plecoptera reflexa*, Gn.; and an Encyrtid and a Cynipid hyperparasite from larvae of *Sphaerophoria javana*, Wied., which were predacious on *Aphis laburni*, in Delhi.

An account is given of the invasion by *Schistocerca gregaria*, Forsk., that began in 1940 [*cf.* **29** 520, 523; **30** 303].

AHMAD (T.). **Report of the Second Entomologist (Dipterist) in Charge of the Scheme for Research on Insect Pests of Sugarcane.**—*Sci. Rep. agric. Res. Inst. New Delhi 1940–41* pp. 64–65. Delhi, 1942.

New records of sugar-cane insects from Coimbatore during the growing season of 1940–41 included *Aspidiotus glomeratus*, Green, *Antonina indica*, Green, *Odonaspis* spp., and *Pseudococcus saccharicola*, Takah., attacking the crop, *Nimboa basipunctata*, Withyc., preying on eggs of *Pyrilla* spp., and *Anagyrus saccharicola*, Timb., parasitising adult females of *Ripersia sacchari*, Green. Examination of sections of the midrib from five varieties of sugar-cane showed that the three more resistant to attack by *Scirpophaga nivella*, F., had larger and more closely arranged vascular bundles, with the associated sclerenchyma sheath and cap in greater prominence, than the others [*cf. R.A.E.*, A **30** 318]. New parasites reared during the year comprised: *Hypolethria ramachandrai*,* Mani, from decaying tunnels of *Sesamia uniformis*, Dudgn., and *Bephratoides saccharicola*,* Mani, from cocoons in tunnels of *Scirpophaga nivella*, in Bihar; *Encarsia isaaci*,* Mani, and *E. muliyili*,* Mani, from nymphs of *Aleurolobus barodensis*, Mask., in Orissa; and *Eretmocerus delhiensis*,* Mani, from nymphs of *Neomaskellia bergi*, Sign., and *Telenomus saccharicola*,* Mani, from the eggs of a Pentatomid on sugar-cane, in New Delhi. Differences in the yield of cane at harvest indicated that the release of *Trichogramma minutum*, Ril., gave significant control of stem borers, mainly *Proceras* (*Argyria*) *sticticraspis*, Hmps., and the root borer, *Emmalocera depressella*, Swinh., in Bihar, and the introduction of the Coccinellid, *Brumus suturalis*, F., and *Chrysopa* sp. into Bhopal for the control of *Pyrilla* gave encouraging results.

HARRIS (W. V.). **Annual Report of the Entomologist for the Year 1942.**—7 pp. typescript. [Morogoro] Dep. Agric. Tanganyika [1943].

In 1942, cotton in Tanganyika Territory was damaged by Aphids during the dry period between the rains; by Jassids, of which *Empoasca facialis*, Jac., was widespread and *E. benedettoi*, Paoli, was found only in small numbers; by the American bollworm [*Heliothis armigera*, Hb.] in areas in which maize was planted early, the pink bollworm [*Platyedra gossypiella*, Saund.], which increased rapidly in September with consequent loss of the late crop, and the spiny bollworm [*Earias insulana*, Boisd.]; and by stainers, of which the early

* The original descriptions of these parasites are probably in "Studies on Indian parasitic Hymenoptera Part I"—*Indian J. Ent.* **3** (1941) pp. 25–36, a paper that has not yet been received in this country.—*Ed.*

population was mainly *Dysdercus intermedius*, Dist., *D. fasciatus*, Sign., appearing later and *D. cardinalis*, Gerst., being locally numerous. *Helopeltis bergrothi*, Reut., was observed on garden shrubs and fruit trees early in the year, bred on cotton [*cf. R.A.E.*, A **30** 210] in May and did much damage in restricted localities later. Bananas at Amani have been infested by *Cosmopolites sordidus*, Germ., for over 20 years, and in 1942 the infestation was found to have extended to Lushoto, 30 miles away. This weevil destroyed bananas on a small island in the south of Lake Victoria in 1940 and was subsequently found in Bukoba, near the Uganda border, but is not known to occur elsewhere in Tanganyika Territory. *Thrips tabaci*, Lind., caused reduced yield of onions in one district, and bulrush millet (*Pennisetum typhoideum*) was seriously damaged by *Nezara* spp., which prevented the setting of the grain, and the Tettigoniid, *Homorocoryphus vicinus*, Wlk., which fed on it when it was ripening. Considerable numbers of the Tettigometrid, *Hilda patruelis*, Stål, were observed on cashew [*Anacardium occidentale*]; poor setting of flowers and the shrivelling of young fruits occurred, but the bugs were not considered to be the only cause of the damage. The sisal weevil, *Scyphophorus acupunctatus*, Gylh. [*cf.* **25** 47], was found to be established in the Morogoro area, mainly on *Furcraea gigantea*. It also occurred there on *Agave ingens*, *A. franzosinni* and other garden species but not in plantations of sisal [*A. sisalana*] or plots of the highly susceptible *A. amaniensis*. Tea was attacked by *Heliothrips haemorrhoidalis*, Bch., and an unidentified Psychid, sugar-cane by larvae of an apparently undescribed Melolonthid of the genus *Psilonychus*, of which adults emerged in September, and young *Eucalyptus* trees by the Pentatomid, *Atelocera stictica*, Westw. *Anthores leuconotus*, Pasc., which damaged coffee in some areas, was declared a pest under the Plant Protection Ordinance 1937 [**25** 701] by the Plant Protection (Declaration of Pest) Order 1942 (Government Notice No. 441). Egg-laying by *Nomadacris septemfasciata*, Serv., occurred early in the year on three sites, on two of which most of the hoppers were destroyed and the bands dispersed, and again in December.

Adults of *Mylabris dicincta*, Bertol., which are collected on flowering convolvulaceous weeds, cultivated leguminous plants and sorghum, killed by immersion in boiling water and dried in the sun for the production of cantharidin, were found to contain up to 3 per cent. of the drug.

Southern Rhodesia. Plant Protection Act, 1942.—12 pp. [Salisbury, S. Rhod.] 1942. **Government Notices Nos. 184–187 of 1943.**—4, 1, 1, 1 pp. Salisbury, S. Rhod., 1943.

Under the Plant Protection Act of 1942 [which was brought into force by Proclamation on 9th April 1943], the Governor may make regulations for the eradication or control of pests or the prevention of their spread and for the prohibition, restriction and regulation of the importation of plants and the soil, wrappings, etc., accompanying them. The term pest includes any stage of any invertebrate animal or vegetable organism injurious to plants or plant products, any communicable disease of plants and any agent capable of producing such a disease. The Governor may also require the periodical treatment with insecticides of premises in which tobacco is stored or handled, prohibit the keeping in such premises of other products liable to infestation by tobacco pests, and prescribe measures for the protection from infestation of tobacco for sale or export. The Act includes regulations relating to cured tobacco that were previously contained in the Tobacco Pest Suppression Act [*R.A.E.*, A **21** 423], which, together with the Cotton Pest Prevention Act [*cf.* **26** 366], is repealed.

Government Notices Nos. 184, 185, 186 and 187, all of 9th April 1943, contain regulations issued in terms of the Act and cited, respectively, as the Plant Import, Nursery, Cotton Pest Prevention, and Tobacco Pest Prevention

Regulations 1943. The Nursery Regulations require the annual registration of nurseries, prohibit the sale of nursery stock not grown in a registered nursery, provide for the inspection of nurseries and the compulsory destruction of infested plants, and require the fumigation of all fruit trees and woody plants immediately before their removal from a nursery. The plants must be fumigated for 45 minutes, or 1 hour if so required, in a fumigating chamber with hydrocyanic acid gas generated from not less than 1 oz. sodium cyanide (97–98 per cent. purity), $1\frac{1}{4}$ oz. sulphuric acid of full commercial strength, and 2 fl. oz. water per 200 cu. ft. space for leafless deciduous plants, and per 350 cu. ft. for *Citrus* and other woody evergreens, or from other forms of cyanide used at a rate to produce an equivalent amount of hydrocyanic acid gas. *Aonidiella aurantii*, Mask., *Selenaspidus silvaticus*, Ldgr., *Chrysomphalus dictyospermi*, Morg., *Aspidiotus hederae*, Vall., *C. ficus*, Ashm. (*aonidum*, auct.), *C. pinnulifer diversicolor*, Green, *C. rossi*, Mask., *Lepidosaphes beckii*, Newm., *L. gloveri*, Pack., *Aulacaspis pentagona*, Targ., *Eriosoma* (*Schizoneura*) *lanigerum*, Hsm., and the virus [*Lethum australiense* of Holmes] causing the disease of tobacco known in the Union of South Africa as kromnek are declared to be pests of nursery stock under the Act.

The regulations against pests of cotton, in which *Diparopsis castanea*, Hmps., *Dysdercus* spp. and *Empoasca facialis*, Jac., are declared to be pests, require all landowners, except in exempted areas, to destroy by 1st October each year all cultivated plants of the genus *Gossypium* on their land. The regulations against tobacco pests are in two sections, dealing with growing and cured tobacco. The declared pests of the former are *Bemisia rhodesiaensis*, Corb., tobacco leaf-curl [*Ruga tabaci* of Holmes], tobacco rosette, which is transmitted by *Myzus persicae*, Sulz. [*cf.* **27** 226], and kromnek. The regulations require the complete destruction each year by approved means of all tobacco plants of the Turkish type by 1st September and of other kinds by 1st August. All plants of the genus *Dahlia*, which is declared an alternative host of a pest of tobacco [kromnek disease], growing on land cultivated for tobacco must also be destroyed by these dates. In addition, land must at all times be kept free from living tobacco plants except those required for the current season's crop and all surplus plants in seed-beds must be destroyed. The declared pests of cured tobacco are *Ephestia elutella*, Hb., and *Lasioderma serricorne*, F. Central premises receiving tobacco for handling, storing, sale or export must be so constructed that every part is easily accessible for cleaning and inspection. Inspectors may order the removal from such premises of maize, maize meal, ground-nuts, ground-nut cake or other material that may harbour pests of tobacco, and all unwanted tobacco and refuse must be removed from them within 30 days after handling is completed, leaving only tobacco for use or sale, after which the inside walls of all warehouses, etc., used for the handling or storing of tobacco must be coated with hot lime-wash, containing at least one-third (by volume) of quick-lime.

CARTER (Walter). **A promising new Soil Amendment and Disinfectant.**—*Science* **97** no. 2521 pp. 383–384. Lancaster, Pa., 1943.

Experiments in Hawaii have indicated that a proprietary mixture of equal parts of 1-3 dichloropropylene and 1–2 dichloropropane, obtainable pure and in a crude form containing 25 per cent. impurities, shows promise as a general soil disinfectant for routine application to fields and plots. In experiments in pineapple fields, carried out since the spring of 1940, a dosage of 150 lb. of the mixture in pure form per acre, injected through the mulch paper, gave good results, particularly in an area infested by larvae of *Anomala orientalis*, Waterh., Nematodes and pythiaceous fungi. The results of this treatment were at least equal to those obtained with chloropicrin. The improvement in the condition

of the plants was gradual, so that it is concluded that the treatment had a lasting beneficial effect on the soil populations.

LEVER (R. J. A. W.). **The Cut Worm** *Prodenia litura* **Fabr.**—*Agric. J. Fiji* **14** no. 1 pp. 11–13, 12 refs. Suva, 1943.

Brief notes are given on the appearance of the various stages, life-history and distribution of *Prodenia litura*, F. The larvae feed either like cutworms by cutting off young shoots or simply as defoliators. In laboratory experiments in Fiji, the egg, larval and pupal stages lasted 3–4, 16–19 and 10–11 days, respectively. *P. litura* was first recorded as a pest in Fiji in 1919 [*R.A.E.*, A **8** 27], though it was observed there three years previously, and has since been found on many plants. It is pointed out that though eggs are laid on leaves of coconut [**13** 403], the larvae never feed on this plant. The author has taken them on maize and *Asparagus plumosus*; the chief crops attacked at present are cabbage, turnip, lettuce, dalo [*Colocasia*], carrot, tomato, egg-plant [*Solanum melongena*] and beet. The recorded natural enemies in Fiji include *Telenomus nawai*, Ashm., which parasitises the eggs, and *Pheidole megacephala*, F., and *Chrysopa sanvitoresi*, Nav., which are predacious on them. The larvae are parasitised by *Campoplex* sp. and a Tachinid of the genus *Sturmia*, and the eggs also by *T. remus*, Nixon, which was described from *Spodoptera mauritia*, Boisd., in Malaya [**26** 89] and was first observed in Fiji in 1939, where it attacks the eggs of both moths.

When feeding as cutworms, the larvae can be controlled by a poison bran bait; on cabbage in the field, they were killed by a spray of 1 fl. oz. nicotine sulphate in 6 gals. water applied primarily against *Crocidolomia binotalis*, Zell., and *Plutella maculipennis*, Curt. Collection of the egg-masses should be encouraged.

LEVER (R. J. A. W.). **Entomological Notes.**—*Agric. J. Fiji* **14** no. 1 pp. 14–18, 18 refs. Suva, 1943.

Although the laboratory stock of *Syntomosphyrum* (*Melittobia*) *indicum*, Silv., which was introduced into Fiji in 1938 for the control of fruit-flies [*cf. R.A.E.*, A **26** 703], died out in 1939 [*cf.* **29** 495], the parasite was recovered in May 1940. Only 1,700 examples were liberated, however, and it was feared that it had not become established, but it was again recovered in 1942, from pupae of *Sarcophaga auricaudata*, End., and 1,750 were released in that year. The parasite matures readily in 16–18 days in the larvae of this Sarcophagid.

Examination of a small plot of sugar-cane near Suva in November 1942 showed severe local damage by larvae of *Rhabdoscelus* (*Rhabdocnemis*) *obscurus*, Boisd., but many had been parasitised by the introduced Tachinid, *Ceromasia sphenophori*, Villen. [*cf.* **9** 596]. A Scolytid found in June 1940 in fallen seeds of *Podocarpus vitiensis* was identified as *Coccotrypes* sp. near *dactyliperda*, F. Previous local records of this species are from palm seeds and dates. Infestation of stored roots of *Derris* by the Bostrychid, *Xylothrips religiosus*, Boisd. [*cf.* **31** 232] has been checked by storing only roots up to $\frac{1}{2}$ in. in diameter.

Recent records of stored-product pests in Fiji are *Sitodrepa panicea*, L., in cumin seeds (*Cuminum cyminum*) and imported coriander seeds, *Rhizopertha dominica*, F., in oatmeal, *Calandra oryzae*, L., *Tribolium castaneum*, Hbst., *Carpophilus dimidiatus*, F., *R. dominica*, *Laemophloeus minutus*, Ol., and *Corcyra cephalonica*, Staint., in flour, *Lasioderma serricorne*, F., on dried bean pods and dried cabbage leaves, and *Oryzaephilus surinamensis*, L., and *Carpophilus dimidiatus* in a tin of dried dates imported from New South Wales. Additional records of insects attacking vegetable garden crops [*cf.* **31** 265] include *Hymenia*

recurvalis, F., on spinach and sweet potato, *Heliothis armigera*, Hb., boring into fruits of bitter gourd (*Momordica charantia*), *Acrocercops coerulea*, Meyr., on bean leaves, and *Brachyplatys pacificus*, Dall., adults of which are often found pairing on leaves of beans, pigeon pea [*Cajanus cajan*] and *Hibiscus tiliaceus*. Eggs of this Plataspid that are not parasitised by *Ooencyrtus pacificus*, Wtstn., should be destroyed. The adults can be jarred into an empty kerosene tin containing soapy water. A table showing the recommended amounts of several common insecticides for the preparation of sprays for use in vegetable gardens is appended.

DUMBLETON (L. J.). **The Control of Subterranean Grass Caterpillar in Pastures.**—*N. Z. J. Agric.* **66** no. 2 pp. 79–80, 1 fig. Wellington, N.Z., 1943.

A brief account is given of the life-history of the subterranean grass caterpillars of the genus *Oxycanus* in New Zealand, the damage they cause to pasture and their control [*cf. R.A.E.*, A **29** 542]. They cause most injury to the better pastures of ryegrass [*Lolium* sp.] and white clover [*Trifolium repens*], but other clovers and mixed pastures, even those containing much cocksfoot grass [*Dactylis glomerata*], are also severely damaged. A spring-sown pasture is seldom injured during the first year, but may show a light patchy infestation in the second and be completely destroyed in the third. Infestation appears to be favoured by keeping the grass for hay or seed, but heavy rainfall in November in a district where it is normally light may make a grazed pasture liable to injury, particularly on land with a southern aspect. If soil samples 1 ft. square and 6 ins. deep, taken in January, show an average of 10 larvae or more per sq. ft. throughout a field, severe damage is likely to develop in the autumn. Three seasons' work has shown that about 80 per cent. of the larvae can be killed and severe injury during the current season prevented by a single application of a bait containing 2 lb. Paris green or 4 lb. lead arsenate, 50 lb. bran and 6 gals. water per acre.

LLOYD (D. C.). **Further Experiments on Host Selection by Hymenopterous Parasites of the Moth, *Plutella maculipennis* Curtis.**—*Rev. canad. Biol.* **1** no. 6 pp. 633–645, 9 refs. Montreal, 1942. (With a Summary in French.)

The following is substantially the author's summary. Experimental work on the interrelations of the discriminatory faculties of the Hymenopterous parasites of *Plutella maculipennis*, Curt. [*cf. R.A.E.*, A **29** 64] has been extended to include the oviposition responses of *Thyraeella* (*Diadromus*) *collaris*, Grav., and *D. subtilicornis*, Grav. Females of both species rejected pupae containing advanced larval stages of either species. *T. collaris* also rejected hosts containing 24-hour-old eggs of *D. subtilicornis*, but the latter sometimes oviposited in pupae containing eggs of the former. When supplied with a choice of hosts containing eggs of either species, they both laid the majority of their eggs in hosts already containing eggs of *T. collaris*. This tendency of *T. collaris* to superparasitise hosts [*cf. loc. cit.*] and that of *D. subtilicornis* to multiparasitise hosts was confirmed by experiments in which host pupae containing eggs of either species, unparasitised pupae, or prepupae containing larvae of *Angitia cerophaga*, Grav., were given to the females for numerous brief exposures. Elimination of supernumerary larvae in superparasitism and multiparasitism was usually by combat in the early instars and neither species was intrinsically superior. It is concluded that, on the evidence available, the introduction of *D. subtilicornis* against *P. maculipennis* in New Zealand, where *T. collaris* has already been established, would be justifiable.

Simmonds (F. J.). **The Occurrence of Superparasitism in *Nemeritis canescens* Grav.**—*Rev. canad. Biol.* **2** no. 1 pp. 15–49, 9 graphs, 33 refs. Montreal, 1943. (With a Summary in French.)

The following is largely the author's summary of laboratory investigations on superparasitism (as defined by H. S. Smith [*R.A.E.*, A **5** 16]) by *Nemeritis canescens*, Grav., in larvae of *Ephestia kuehniella*, Zell. As shown by G. Salt [**22** 204], *Trichogramma evanescens*, Westw., lays fewer eggs during its life when the number of hosts available is such that the normal complement cannot be laid without superparasitism. In contrast with this, the total number of eggs laid by females of *Nemeritis canescens* is not decreased when hosts are few, even though this may entail heavy superparasitism. Superparasitism is avoided to a certain extent, but both discrimination (the power of distinguishing between a parasitised and an unparasitised host) and restraint (the power of refraining from ovipositing in a host that is distinguished as parasitised) are imperfect, the imperfection of the former being due to the fact that the parasite can distinguish a parasitised host for only a limited period after oviposition has occurred in it. Direct observation confirmed this ability, and curves calculated on the assumption that immunity is temporary agree very well with the distribution of parasite eggs obtained from dissections. When superparasitism occurs, all except one of the parasite larvae are eliminated when in the first instar. This elimination is brought about by a stunting of the supernumerary larvae caused by a conditioning of the haemolymph of the host. When transplanted from superparasitised host larvae, some of these stunted parasite larvae are able to grow normally and emerge as adults. The development time of the parasite is lengthened by superparasitism and is increased from 21·5 to 27·5 days when the ratio of ovipositing parasites to available hosts is increased from 1 : 200 to 10 : 25. This is due to the same stunting that causes elimination of the supernumerary larvae. With an increasing ratio of parasites to hosts, the number of progeny per female decreases owing to the waste of parasite eggs due to superparasitism ; but superparasitism does not prevent successful emergence of *Nemeritis* from a host, except when large numbers of parasite eggs occur in the same host, when neither host nor parasite emerges.

Morrison (F. O.). **The Standardizing of a Laboratory Method for comparing the Toxicity of Contact Insecticides.**—*Canad. J. Res.* (D) **21** no. 3 pp. 35–75, 13 figs., 41 refs. Ottawa, 1943.

The following is the author's abstract. Toxicity tests were conducted with nicotine sulphate and nicotine alkaloid using *Drosophila melanogaster*, Mg., as the test animal, with a modified Tattersfield atomizer spray machine [*cf. R.A.E.*, A **23** 82], and by an immersion technique. One hundred and fifty flies were treated at each concentration each day. Each experiment was replicated eight or ten times using 3 to 22 concentrations. Data were analysed by the method of analysis of variance and by means of probits. It appears from the data secured that careful standardisation of any technique will be needed to secure comparable results. Results from spraying were the more uniform and consistent. Saponin spreader had a synergistic action with nicotine sulphate. It complicates results and its effect cannot be separated from that of the insecticide. Variations in observed mortalities result from different rates of spray application (slower applications were better), different ages of test animals (day-old flies and flies over four days old were most susceptible), different numbers of test animals per container (increased numbers increased the kill), different populations (these vary greatly in susceptibility), differences in larval and adult nutrition, and the use of different sized fly containers. All these factors must be standardised or accounted for. When this was done, variations due to different experimenters were not significant. In general six

or eight replications were enough to establish a curve. Analysis of variance on angular transformation values gives a good test for consistency and the method of probits reveals much heterogeneity in the data.

VENABLES (E. P.). **Observations on the Clover or Brown Mite, *Bryobia praetiosa* Koch.**—*Canad. Ent.* **75** no. 3 pp. 41–42, 1 ref. Guelph, Ont., 1943.

Observations on *Bryobia praetiosa*, Koch, at Vernon in 1941 indicate that two biological races of this mite occur in British Columbia, one being confined to deciduous trees and having several generations in the year, and the other infesting grasses and low-growing plants and having only one generation [*cf. R.A.E.*, A **11** 131]. In early March, débris composed of cast skins of the mite, empty egg chorions and dead adults was found on the inner side of the base boards of the insectary building, together with unhatched eggs, and the latter have since been found in similar situations providing dry and sheltered conditions. Embryonic development is far advanced by late autumn and hatching occurs in spring as soon as their neighbouring food-plants begin to form leaves ; owing to the proximity of these plants to walls and other objects reflecting the warmth, they begin to grow very soon after the snow has melted, which may be some weeks before the eggs of the mite on fruit trees begin to hatch. The mites move from the food-plants to dry and protected situations before each moult and before ovipositing, and quiescent mites, moulted skins or eggs of the single-brooded race were not at any time found on infested plants. Herbaceous plants that were heavily infested with mites during April and early May were deserted by the middle of June, whereas a succession of generations was observed on neighbouring apple trees, with active mites occurring until late autumn.

HEINRICH (C.). **A new Species of *Laspeyresia*, a Bean Pest from tropical America (Lepidoptera : Olethreutidae).**—*Proc. ent. Soc. Wash.* **45** no. 3 pp. 71–72, 5 figs. Washington, D.C., 1943.

Descriptions are given of the adults of both sexes of *Cydia* (*Laspeyresia*) *leguminis*, sp. n., from Peru, where the larvae cause considerable damage by boring into the stems and pods of lima, string and soy beans. It has also been collected in Panama and Salvador, and adults have been reared and larvae and pupae taken in quarantine in the United States from string beans from Mexico.

OMAN (P. W.). **A new Leafhopper of the Genus *Helochara* (Homoptera, Cicadellidae).**—*Proc. ent. Soc. Wash.* **45** no. 3 pp. 74–75, 2 figs. Washington, D.C., 1943.

The Jassid, *Helochara delta*, sp. n., is described from California, where it is suspected of being a vector of the virus that causes Pierce's disease of grape vines [*cf. R.A.E.*, A **30** 227].

BLACK (L. M.). **Some Relationships between Potato Yellow-dwarf Virus and the Clover Leaf Hopper.**—*Phytopathology* **33** no. 5 pp. 363-371, 7 refs. Lancaster, Pa., 1943.

The following is based on the author's summary. Nymphs of *Aceratagallia sanguinolenta*, Prov., in the third, fourth and fifth instars transmitted *Marmor vastans* var. *vulgare* of Black (the virus of potato yellow-dwarf) [*cf. R.A.E.*, A **31** 276] in many instances. One record was obtained of transmission by a nymph in the second instar. No significant difference in mortality between infective and non-infective individuals was observed. The incubation period of the virus in crimson clover (*Trifolium incarnatum*) was variable. Most of the plants developed symptoms in the second and third weeks after the feeding or inoculation period of one week. Some developed symptoms during the first

week after the feeding period, others not until the fifth. The incubation period of the virus in the insect was shown to be 6–10 days. There is evidence that in individual insects the incubation period may be much longer. Individuals may infect crimson-clover seedlings daily for at least 10 days. On the other hand, a lapse of many days between transmissions is common. In one case there was an interval of 25 days between two transmissions by the same individual. Leafhoppers transferred daily to fresh, healthy clover plants remained infective for up to 44 days, and those fed on rye for up to 52 days. The progeny of infective adults were non-infective in all cases.

Graham (C.) & Ditman (L. P.). **The Control of the Mexican Bean Beetle and the Corn Earworm on Beans.**—*Trans. Peninsula hort. Soc.* 1942 pp. 54–57. Dover, Del., 1943.

Experiments were carried out in Maryland in 1942 on substitutes for a dust containing 0·75 per cent. rotenone for the control of *Epilachna varivestis*, Muls., on lima beans, and on their value against *Heliothis armigera*, Hb., which did serious damage to lima and string beans in 1942, particularly in late autumn plantings that flowered after the maize silks and ears in adjoining fields had dried. The dusts were applied at rates per acre of 54–63 lb. on 11th August, 31–34 lb. on 27th August and 30 lb. on 9th September. The average yields of shelled beans were 89·6 lb. for a dust containing 0·75 per cent. rotenone, which was the most effective against *Epilachna* but ineffective against *Heliothis*, 83·5 lb. for a dust containing 0·4 per cent. rotenone and lethane, which gave fair control of the beetle but not of *Heliothis*, 69 lb. for a dust of 68 per cent. actual cryolite, which gave the highest percentage of pods uninfested by *Heliothis* (about 90, as compared with about 70 on untreated plants), but failed to control the beetle, 16·25 lb. for one containing 14·2 per cent. calcium arsenate and 4·6 per cent. yellow cuprous oxide, which gave some control of *Heliothis* but none of *Epilachna* and scorched the plants severely, and 41·25 lb. in the controls. It is evident that if both pests are present in lima beans, separate applications of rotenone and cryolite will be necessary to protect the plants. When applied to string beans on 14th September at the rate of 38 and 11½ lb. per acre, respectively, against *Heliothis*, the calcium-arsenate dust gave slight control, but injured the foliage and pods, and the cryolite dust gave good control without injuring the plants.

Chada (H. L.), Ditman (J. A.) & Daigh (F. C.). **Progress during 1942 of the Program for the Colonization of the Milky Disease of Japanese Beetle Larvae in Delaware. Second Report.**—*Trans. Peninsula hort. Soc.* 1942 pp. 86–92, 1 fig., 1 ref. Dover, Del., 1943.

This second progress report of work on the establishment of type A milky disease, caused by *Bacillus popilliae*, among larvae of *Popillia japonica*, Newm., in Delaware [*cf. R.A.E.*, A **30** 596] includes a description of the method of inoculating and incubating the larvae for the preparation of the spore dust. The inoculated larvae were kept for 11 days in layers in soil in which grass seed was germinating, and the results obtained in soil that was impervious to air were improved by the addition of coarse sand. A survey of the plots in which colonisation was carried out in 1941 gave inconclusive results, as adverse weather reduced the beetle population, but indicated that the disease is becoming established. Approximately 130,000 full-grown larvae, dug from sod in a heavily infested area in Delaware in the autumn and winter of 1941–42, were inoculated, and 54·7 per cent. of them developed the disease. About 2,000 lb. spore dust prepared from them was distributed in 1942, almost all in Kent and

Sussex counties. A summary of the distribution in the two years is given in a table.

Fenton (F. A.). **The Flatheaded Apple Tree Borer** (*Chrysobothris femorata* (**Olivier**)).—*Bull. Okla agric. Exp. Sta.* no. 259, 31 pp., 12 figs., 21 refs. Stillwater, Okla., 1942.

The following is based largely on the author's summary of this report of investigations in 1935–40 on the biology and control of *Chrysobothris femorata*, Ol., in Oklahoma, where it is a serious pest of newly transplanted or devitalised fruit, shade and nut trees, particularly apple and elm [*cf. R.A.E.*, A **26** 136]. The life-cycle is usually completed in one year ; data on the emergence of beetles from wood infested in 1935 and 1936 showed that 89·9 and 87·2 per cent., respectively, matured in one year, 8·9 and 12·1 per cent. in two and 1·2 and 0·7 per cent. in three. Emergence begins early in May and continues until early August in some years, and adults are present in the field until early October. They feed on the tender bark, especially in crotches and round bud scars, and sometimes cause shedding of the leaves by biting through the petioles ; they lived for an average of 26 days in the laboratory. The females begin to oviposit 4–8 days after feeding, preferably on sickly, dying or recently transplanted trees. The eggs are inserted in cracks in the bark or in wounds, in sunny areas on the tree trunks and larger branches, and hatch in 6–8 days. The larvae burrow into the bark immediately beneath the egg shell and develop in the cambium region until late summer, when they burrow into the xylem to hibernate. The majority pupate in the following spring, the pupal stage lasting 8–14 days under favourable conditions.

The larvae may kill recently transplanted trees by girdling them or the tops of the trees by girdling them at the crotch. Surviving trees may be so severely injured that they die a year or two later, but if the injury is not in any vital part, the tree may recover, particularly if it is in a favourable situation. Older well-established trees become susceptible to attack during dry years, owing to their devitalised condition and the large numbers of beetles that may develop under such conditions. *C. femorata* reached its peak of abundance in Oklahoma during 1936 and 1937 and was relatively scarce in 1938 and 1939, owing to control by natural enemies. Parasites reared from infested material comprised *Labena grallator*, Say, *Cryptohelcostizus chrysobothridis*, Cushm., *Phasgonophora sulcata*, Westw., *Heterospilus astigma*, Ashm., *Atanycolus rugosiventris*, Ashm., and two undescribed species of *Eusandalum*. The first three were the most important, and cage records showed that the percentage parasitism increased from 6·9 in 1936 to 58·6 in 1938. The predacious Clerids, *Chariessa pilosa*, Forst., and *C. p. onusta*, Say, were important in 1936 [*cf.* **26** 137], and the Asilid, *Andrenosoma fulvicauda*, Say, was reared in moderate numbers from infested wood in 1938. In one year, walnut was more heavily attacked than apple, and only 11·8 per cent. of Asiatic elms (*Ulmus pumila*) were killed as compared with 51·9 per cent. of American elms (*U. americana*).

Variable results were obtained with tree paints [*cf.* **27** 420] ; two formulae gave a considerable degree of protection for a short period, but lack of infestation in later years prevented further investigations on them ; in one test the paints seemed to protect the borer from its parasites and in another they attracted the beetles. Paper, wrapped round the trees in a spiral, gave the best protection [*cf. loc. cit.*]. To be most effective it should be in place by early May and remain on the tree for the first growing season, or until about 1st October, and should extend from a few inches below ground level to beyond the point in the crown where the first branches originate ; the bases of these should also be wrapped. The best paper is a medium heavy, specially treated water-resistant material with a certain amount of resilience to allow for the growth of the trunk.

VERRALL (A. F.). **Fungi associated with certain Ambrosia Beetles.**—*J. agric. Res.* **66** no. 3 pp. 135–144, 5 figs., 7 refs. Washington, D.C., 1943.

This is a report of the mycological findings of a study of the fungi associated with certain ambrosia beetles of economic importance in the deterioration of green hardwood logs and timber [*cf. R.A.E.*, A **30** 390], made in the course of general investigations on the biology of ambrosia beetles of the southern United States, and four fungi are described as new. They are *Endomyces bispora*, associated with *Platypus compositus*, Say, *Cephalosporium pallidum* with *Xyleborus affinis*, Eichh., *C. luteum* with *X. pecanis*, Hopk., and *Monilia brunnea* with *Pterocyclon mali*, Fitch, and *P. fasciatum*, Say. The fungi are apparently used as food by the beetles with which they are associated and probably cause the restricted black or brown stain adjacent to the beetle tunnels.

CURRAN (C. H.). **The parasitic Habits of** *Muscina stabulans* **Fabricius.**—*J. N. Y. ent. Soc.* **50** no. 4 pp. 335–336. Lancaster, Pa., 1942.

About a dozen larvae of the American tent caterpillar [*Malacosoma americana*, F.] were collected in New York in early June 1942 and placed in a jar, the lid of which was tightly screwed down. During the following month, two moths and 28 adults of *Muscina stabulans*, Fall., emerged in the jar, and about ten more flies were found entangled in the cocoons when it was opened. It appeared certain that the *Muscina* larvae had been endoparasitic in the caterpillars, most of which must have contained more than one. In 1941, the author received specimens of *M. stabulans* reared from larvae found in New York preying upon pupae of the elm leaf beetle [*Galerucella luteola*, Müll.] round the base of a tree. In his opinion, the larvae are not scavengers, as has generally been believed, but are normally predacious, and their association with the larvae of house-flies [*Musca domestica*, L.] and other insects is due to this habit. Records of parasitism by *M. stabulans* are not numerous, and the parasitic habit probably occurs only where conditions are favourable.

HINCKS (W. D.). **Nomenclature of two Species of Aphidiidae (Hym.).**—*Ent. mon. Mag.* **79** no. 945 p. 44. London, 1943.

Aphidius cirsii was described in 1831 by Curtis, who believed it to be parasitic on an Aphid infesting *Cirsium arvense*. In 1833, Haliday described the same specimen, which he had reared from an Aphid on sycamore (*Acer pseudoplatanus*), renamed it *aceris* and placed it in his subgenus *Trioxys*. Subsequent workers have followed Haliday, but the author points out that a name must not be rejected on grounds of inappropriateness and that the correct designation of this species is *T. cirsii*, Curt. He proposes the new name *Aphidius renominatus* for another species subsequently described by Haliday as *A. cirsii*.

BARNES (H. F.). **A further Note on the unusual Abundance of** *Orgyia antiqua* **L. (Lep., Lymantriidae).**—*Ent. mon. Mag.* **79** no. 945 p. 47. London, 1943.

Larvae of *Orgyia antiqua*, L., were very numerous on whortleberry [*Vaccinium*] in North Wales in 1942 and about 2,500 were collected for rearing. Most of these pupated at once, and those that did not fed readily on willow leaves. Of the 1,205 moths that emerged, only 68 were males; it is thought that most of the male larvae had pupated before the collection was made. The low total emergence was largely due to the fact that many larvae dried up before or just after spinning their cocoons, possibly owing to a disease. Parasites comprised 15 of the Braconid, *Rhogas geniculator*, Nees, and two and 18 of the Tachinids, *Zenillia* (*Carcelia*) *gnava*, Mg., and *Neopales pavida*, Mg. This is the first British record of *Z. gnava* from *O. antiqua*.

Hinton (H. E.). *Stethomezium squamosum* **gen. et sp. n. infesting stored Food in Britain, with Notes on a South African Ptinid not previously recorded in stored Products (Coleoptera).**—*Proc. R. ent. Soc. Lond.* (B) **12** pt. 3–4 pp. 50–54, 6 figs. London, 1943.

A description is given of *Stethomezium squamosum*, gen. et sp. n., from adults recently found in England in a tin box containing roots of *Maerua pedunculosa* imported from South Africa in 1918 and a box of leaves of belladonna [*Atropa belladonna*] imported from Egypt in 1917. Many adults and larvae and a few pupae of this Ptinid were found in the boxes, and examples of *Sitodrepa* (*Stegobium*) *panicea*, L., *Anthrenus verbasci*, L., *Trigonogenius globulus*, Sol., *Calandra granaria*, L., and *Ptinus tectus*, Boield., listed in order of abundance, were found in the tin of roots, and the same species, with the exception of *Calandra* and *Ptinus*, were breeding in the belladonna leaves.

Specimens in the British Museum of *Mezium natalense*, Péring., which has not previously been recorded in stored products, include three that were found breeding in blood meal in Southern Rhodesia and one from cotton-wool stoppers of bottles in the Transvaal. A key is given distinguishing this species and *M. affine*, Boield., and *M. americanum*, Lap., which are known to breed in dried animal and vegetable products.

Forest Products Research. **Recognition of Decay and Insect Damage in Timbers for Aircraft and other Purposes.**—iii+18 pp., 4 pls. London, Dep. sci. industr. Res., H.M.S.O., 1943. Price 6*d*.

This booklet is published to assist inspectors and others handling aircraft timbers to recognise fungous and insect damage and to distinguish between defects that impair the strength of the timber and blemishes that only mar its appearance. The first part deals mainly with timbers ordinarily employed in the manufacture of aircraft and airscrews; methods of distinguishing fungous decay from discolorations that may be confused with it are given, the defects caused by insects are discussed and those characteristic of individual timbers are described. The section concerned with insect damage comprises a key for the recognition of the common types of insect attack as they appear in Britain in converted timber from which all bark has been removed, an account of the comparative importance of the different types of injury, and a table showing the types of defect that are found in different hardwoods, softwoods, bamboos and plywoods of tropical woods and the frequency with which they occur. The second part is a list of timbers in general use, with notes on their resistance to decay and insect attack.

Ander (K.). **Några iakttagelser över betinsekter 1940.** [Some Observations on Beet Insects in 1940.]—*Opusc. ent.* **6** no. 1 pp. 30-32, 1 fig. Lund, 1941. [Recd. 1943.]

In view of a report that *Cassida nebulosa*, L., was causing injury to sugar-beet in southern Sweden in 1940, the author examined many beet fields in this area in the course of the summer and found that the species responsible for the damage, which was not great, was *C. nobilis*, L., which has not previously been recorded as a pest of beet in Sweden. *C. nebulosa* occurred on beet in only one district, but was common on *Chenopodium*. These two Cassidids have similar life-histories. Both the larvae, which are briefly described, and the adults feed on the leaves, sometimes stunting or killing young plants. They were commonest on the edges of fields; adults of *C. nobilis* were observed from the end of June, and there was no evidence of a second generation of either species. A small Chalcidoid, probably *Tetrastichus bruzzonis*, Masi, emerged from larvae of *C. nebulosa*.

Other insects observed on beet, but usually in small numbers, were *Subcoccinella vigintiquatuorpunctata*, L., *Pegomyia hyoscyami*, Panz., which caused slight injury to the leaves in one district, *Aphis fabae*, Scop., which was common in the district of Lund at the end of July and the beginning of August and damaged the young leaves, and *Eurydema oleraceum*, L., which was common in another district. *Cneorrhinus* (*Philopedon*) *plagiatus*, Schall., which was also reported as injuring beet, was not observed on this plant but was common on lucerne.

HERING (E. M.). **Ein neuer Spargelfeind. Die Zwergspargelfliege** (*Ptochomyza asparagi* **g. n., sp. n.**). [A new Pest of Asparagus. The Dwarf Asparagus-fly, *Ptochomyza asparagi*, gen. et sp. n.]—*Z. PflKrankh.* **52** pt. 12 pp. 529–533. Stuttgart, 1942.

The new genus, *Ptochomyza*, which is very closely allied to *Phytomyza*, is erected for *P. asparagi*, sp. n., both sexes of which are described. Larvae of this fly were observed mining in the leaves and smaller branches of asparagus near Jüterbog, Brandenburg, in August 1941. They pupated in the mine, and adults emerged in February from pupae kept indoors from December. *P. asparagi* is the smallest mining fly known.

KOVACHEVSKY (I. C.). **Die Buntblättrigkeit der Paprikapflanze** (*Capsicum annuum*) (*Medicago* **Virus 2 K. Smith var.** *typicum* **Black u. Price**). [Leaf Mosaic of Red Pepper (*Capsicum annuum*).]—*Z. PflKrankh.* **52** pt. 12 pp. 533–540, 7 figs., 10 refs. Stuttgart, 1942.

The symptoms are described in detail of a mosaic disease of red pepper (*Capsicum annuum*) that is widely distributed in Bulgaria and in late summer often affects 30–40 per cent. of the plants in fields in which it occurs. It results in some deformation of the fruits and a reduction in crop, but is less serious than some other virus diseases of this plant. In experiments, the virus was transmitted by expressed sap to *C. annuum* and lucerne and, in isolated cases, to tobacco and *Datura stramonium*, but not to potato, and by *Myzus persicae*, Sulz., from infected *C. annuum* to 3 of 6 healthy *Capsicum* plants in 1 of 3 series. From these and further experiments on mechanical transmission in 1941 and a consideration of the literature, it is concluded that the virus is probably *Marmor medicaginis* of Holmes, var. *typicum* of Black & Price, the causal agent of lucerne mosaic.

Ajroldi has recently recorded a similar mosaic disease of *C. annuum* from the region of Milan, but stated that in experiments it was not transmitted by Aphids or other insects, though it resembled a virus disease of *C. annuum* in Spain that is apparently transmitted in the field by Aphids.

SYLVÉN (N.). *Cordyceps militaris* **Fr. på** *Dasychira pudibunda* **(L.).** [*C. militaris* on *D. pudibunda*.]—*Bot. Not.* 1942 pp. 97–98, 1 fig. Lund, 1942. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 546–547. Stuttgart, 1942.)

The author reviews cases in which *Cordyceps militaris* has afforded control of the larvae and pupae of injurious Lepidoptera and states that this fungus caused great mortality of the pupae of *Dasychira pudibunda*, L., during an outbreak of this Lymantriid in a beech forest in Skåne, Sweden. It has not often been recorded from Sweden, but is probably commoner there than has been thought.

Brummer (V.). **Beiträge zum Problem der durch Thysanopteren verursachten Schartigkeit des Roggens.** [Contributions to the Problem of the Indentation of the Ears of Rye due to Thysanoptera.]—*J. sci. agric. Soc. Finland* **11** pp. 127–145. 1939. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 550. Stuttgart, 1942.)

Details are given of the composition of the populations of Thysanoptera on rye in Finland in 1937 and 1938. *Haplothrips aculeatus*, F., constituted about 90 per cent. of the population on the ears in both years, and is considered to be a cause of indentation of the ears. It is also stated, however, that in the material examined this injury was caused more frequently by the larvae of the Cecidomyiids, *Contarinia tritici*, Kby., and *Sitodiplosis mosellana*, Géh. (*Clinodiplosis aurantiaca*, Wagn.) and of the Noctuid, *Apamea* (*Hadena*) *basilinea*, Schiff., than by the thrips.

Sellke (K.). **Versuche zur Auslese kartoffelkäferfester Kartoffelsorten.** [Experiments in the Selection of Potato Varieties resistant to the Potato Beetle.] —*Mitt. biol. Reichsanst.* no. 65 pp. 9–10. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 551. Stuttgart, 1942.)

Further investigations on the resistance of potato hybrids to *Leptinotarsa decemlineata*, Say [*cf. R.A.E.*, A **27** 107; **28** 448, 449] showed that the F_2 generation of hybrids of potato and *Solanum demissum* were not more resistant than pure strains of potato. It is doubtful whether *S. demissum* is poisonous to the beetles, for they died more quickly when starved than when fed on the leaves of this plant.

Tomaszewski (W.). **Neuere Versuche zur Kornkäferbekämpfung.** [Recent Experiments on the Control of *Calandra granaria*.]—*Mitt. biol. Reichsanst.* no. 65 p. 17. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 552. Stuttgart, 1942.)

A preparation releasing hydrogen phosphide gas proved satisfactory in experimental fumigation against *Calandra granaria*, L., in empty store rooms. This treatment is complementary to the fumigation of the grain itself, and is also effective against *Ephestia kuehniella*, Zell. All stages of *C. granaria* were killed by hydrogen phosphide gas, even at temperatures as low as 2°C. [35·6°F.], provided that the preparation was completely decomposed.

Janisch (E.). **Das Temperaturoptimum der Wiesenschnake** *Tipula paludosa*. [The Temperature Optimum for *T. paludosa*.]—*Mitt. biol. Reichsanst.* no. 65 p. 38. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 553. Stuttgart, 1942.)

The optimum temperature for the hatching of the larvae of *Tipula paludosa*, Mg., lies between 14 and 15°C. [57·2 and 59°F.]. A hitherto unknown infectious black spot disease was observed in the larvae.

Thiem (H.). **Ueber Epidemiologie und Bekämpfung der Kirschfruchtfliege** (*Rhagoletis cerasi*). [On the Epidemiology and Control of the Cherry Fruit-fly.]—*Mitt. biol. Reichsanst.* no. 65 pp. 38–39. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 553–554. Stuttgart, 1942.)

Symphoricarpus racemosus serves as an alternative host-fruit of *Rhagoletis cerasi*, L., in Germany but is of less importance than *Lonicera tatarica* and *L. xylosteum* [*cf. R.A.E.*, A **22** 247].

THIEM (H.) & STEUDEL (W.). **Untersuchungen zur Biologie und Bekämpfung des Maikäfers und seiner Engerlinge.** [Investigations on the Biology and Control of Cockchafers and their Larvae.]—*Mitt. biol. Reichsanst.* no. 65 pp. 39–40. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 552–553. Stuttgart, 1942.)

In experiments made in Germany early in spring against cockchafer larvae (*Melolontha*), carbon bisulphide gave good results when used alone at the rate of approximately 1 fl. oz. per sq. yd., whereas about 6 fl. oz. carbon bisulphide was required when it was applied as an emulsion.

THIEM (H.). **Untersuchungen zur Biologie und Bekämpfung des Birnenknospenstechers (*Anthonomus pyri* Koll.).** [Investigations on the Biology and Control of the Pear Blossom Weevil.]—*Mitt. biol. Reichsanst.* no. 65 p. 40. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 553. Stuttgart, 1942.)

Sprays containing dinitro-ortho-cresol or a mixture of derris and pyrethrum were effective against the pear blossom weevil, *Anthonomus piri*, Koll., in experiments in Germany in October 1939, but their value could not be confirmed in 1940 because the adults left their summer quarters earlier than usual owing to prolonged cold, wet weather.

THIEM (H.) & STEUDEL (W.). **Bärenspinnerraupen als gefährliche Gartenschädlinge.** [Arctiid Larvae as dangerous Garden Pests.]—*Mitt. biol. Reichsanst.* no. 65 pp. 41–42. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 553. Stuttgart, 1942.)

Larvae of the Arctiids, *Phragmatobia fuliginosa*, L., and *Arctinia caesarea*, Goeze, appeared in great numbers in gardens in Brandenburg in 1940, and caused particularly severe injury to bush fruits, strawberries, potato, peas, lupins, lettuce and cabbage ; poppy and tomato were not attacked.

KUNIKE (G.). **Untersuchungen über den Schutz von Verpackungsmaterial gegen das Eindringen von Vorratsschädlingen.** [Investigations on the Protection of Packing Material against Penetration by Pests of Foodstuffs.] —*Mitt. biol. Reichsanst.* no. 65 p. 42. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 552. Stuttgart, 1942.)

Ephestia kuehniella, Zell., *E. elutella*, Hb., *Plodia interpunctella*, Hb., *Sitodrepa panicea*, L., *Ptinus* spp., *Bruchus* (*Acanthoscelides*) *obtectus*, Say, and *Spermophagus* (*Zabrotes*) *subfasciatus*, Boh., oviposit on the outside of packets of foodstuffs, drugs, etc., and the larvae bore through the packing material. The females of *Calandra granaria*, L., and *C. oryzae*, L., gnaw through most paper wrappings in order to deposit their eggs on the contents. Completely sealed packing reduces the risk of infestation.

KUNIKE (G.). **Der schwarzbraune Reismehlkäfer, *Tribolium destructor* Uytt.** —*Mitt. biol. Reichsanst.* no. 65 p. 42. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 554. Stuttgart, 1942.)

Larvae of the Tenebrionid, *Aphanotus* (*Tribolium*) *destructor*, Uytt., attack provisions of very varied kinds in Germany and elsewhere [*cf. R.A.E.*, A **27** 623], and in experiments they fed on cereals, oil seeds, leguminous seeds, nuts, cacao beans, dried fruit, potato flakes and bakers' wares. The adults live for up to three years and lay about 1,000 eggs.

Gollmick (F.) & Schilder (F. A.). **Histologie und Morphologie der Rebenblätter in ihren Beziehungen zum Reblausbefall.** [The Histology and Morphology of Vine Leaves in their Relation to Attack by *Phylloxera*.]—*Mitt. biol. Reichsanst.* no. 65 pp. 57–59. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 554. Stuttgart, 1942.)

Phylloxera vitifoliae, Fitch, forms galls on the leaves of European vines only if these are near American vines with galls, and this has usually been ascribed to incapacity of the fundatrix to produce normal galls on the leaves of European vines. Breider has recently attributed the absence of infestation to characters of the leaf-structure, resulting from environmental conditions, such as thickness of the cuticule. Experiments by the authors showed, however, that differences in the thickness of the walls of the epidermal cells do not affect the feeding of *Phylloxera*.

Speyer (W.). **Untersuchungen über tierische Schädlinge und ihre Bekämpfung.** [Investigations on Insect Pests and their Control.]—*Mitt. biol. Reichsanst.* no. 65 pp. 69-70. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 554. Stuttgart, 1942.)

The woolly apple aphis, *Eriosoma lanigerum*, Hsm., and its parasite, *Aphelinus mali*, Hald., were reduced to almost negligible numbers in the orchard districts of the lower Elbe by the cold winter of 1939–40. Promising results against the pupae of the cherry fruit-fly, *Rhagoletis cerasi*, L., were obtained by watering the ground with liquids containing dinitro-ortho-cresol. Fertile offspring were obtained from a female of *Operophtera* (*Cheimatobia*) *brumata*, L., paired with a male of *O. fagata*, Scharfenb. (*C. boreata*, Hb.). *Meligethes aeneus*, F., was found to breed on charlock [*Brassica sinapistrum*] after rape had ripened.

Zillig (H.) & Henrici (H.). **Biologie und Bekämpfung der Traubenwickler** (*Clysia ambiguella* **und** *Polychrosis botrana*). [The Biology and Control of the Vine Moths, *Clysiana ambiguella* and *P. botrana*.]—*Mitt. biol. Reichsanst.* no. 65 p. 72. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 554-555. Stuttgart, 1942.)

Experiments for over three years in Germany showed that wine made from the marc of grapes was useless as a bait for the control of *Clysiana* (*Clysia*) *ambiguella*, Hb., and *Polychrosis botrana*, Schiff., in vineyards, since only 10 per cent. of the estimated populations were taken and the females had already deposited some of their eggs [*cf. R.A.E.*, A **31** 51]. It could be used to some extent as a flight indicator, but gave unreliable results in cool weather, when stale or when diluted by rain.

Kaufmann (O.). **Neuere Erkenntnisse über den Rapserdfloh** (*Psylliodes chrysocephala* **L.**). [Recent Knowledge of the Rape Flea-beetle.]—*Mitt. biol. Reichsanst.* no. 65 pp. 72-74. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 557. Stuttgart, 1942.)

Females of *Psylliodes chrysocephala*, L., deposit over 1,000 eggs, 400–500 of which are laid after overwintering. The most important factor limiting the population is the winter, which causes less mortality among the adults, eggs and second-instar larvae than among the pre-pupae and larvae in other instars. The severe winters of 1938-39 and 1939–40 greatly reduced the numbers of the beetle on rape in Schleswig-Holstein.

Kaufmann (O.) & Frey (W.). **Ueber die Bekämpfung von Kohlerdflöhen auf der Oelfruchtwinterung.** [The Control of Cabbage Flea-beetles on Winter Rape.]—*Mitt. biol. Reichsanst.* no. 65 p. 74. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 555. Stuttgart, 1942.)

Flea-beetles of the genus *Phyllotreta* survived the severe winter of 1939–40 in considerable numbers in northern Germany and destroyed young rape over large areas in the following September. *P. atra*, F., constituted 80 per cent. of the population and *P. undulata*, Kutsch., which is usually the predominant species, only 19·9 per cent. A derris dust (Kümex) with a rotenone content of 0·8 per cent. killed almost all the beetles in field experiments when applied at the rate of 22·5 lb. per acre, and it is probable that a lower rate would still afford effective control. In the laboratory, this dust also gave good results against *Psylliodes chrysocephala*, L.

Frey (W.). **Ueber das Auftreten und die Bekämpfung des Kohlschotenrüsslers.** [The Occurrence and Control of *Ceuthorrhynchus assimilis*.]—*Mitt. biol. Reichsanst.* no. 65 p. 75. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 555. Stuttgart, 1942.)

Observations showed that *Ceuthorrhynchus assimilis*, Payk., hibernates in quickset hedges and the open edges of woods. In 1940, this weevil was more abundant in Schleswig-Holstein than at any time since 1926. A pyrethrum dust gave excellent control, and the use of mobile traps in rape fields [*cf. R.A.E.*, A **25** 487] reduced infestation by 97–98 per cent. after three hours and 64–74 per cent. after one day. As the height of injury occurs when the plants are in full bloom, control is very difficult.

Kaltwasser (J.). **Der Nahrungswert des Holzes für die Larven des Hausbockkäfers** (*Hylotrupes bajulus*). [The nutritional Value of Wood for the Larvae of *H. bajulus*.]—*Mitt. biol. Reichsanst.* no. 65 pp. 78–79. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 555. Stuttgart, 1942.)

In further experiments in Germany on factors affecting the growth of *Hylotrupes bajulus*, L. [*cf. R.A.E.*, A **31** 51], the duration of total development was reduced to 14 months by impregnating the timber with protein substances. Suspensions of diastase caused especially marked acceleration in larval growth, but impregnation with soluble carbohydrates did not influence the rate of development. The larvae developed also in deciduous wood and in the heartwood of pine if substances, such as resin, that are harmful to them were removed.

Fulmek (L.). **Erforschung und Bekämpfung der San José-Schildlaus.** [Research on and Control of the San José Scale.]—*Mitt. biol. Reichsanst.* no. 65 pp. 95–96. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 556. Stuttgart, 1942.)

In Austria, outbreaks of *Aspidiotus perniciosus*, Comst., occur only in the warmer districts [*cf. R.A.E.*, A **30** 249]. The natural enemies recorded are the Coccinellids, *Chilocorus bipustulatus*, L., and *Exochomus quadripustulatus*, L., the Nitidulid, *Cybocephalus politus*, Gylh., the Capsid, *Deraeocoris ruber*, L., and the Mymarid, *Polynema fulmeki*, Soyka.

Enser (K.). **Histologische Untersuchungen über den Saugstich von** *Aspidiotus perniciosus* **Comst.** [Histological Investigations on the Puncture made by *A. perniciosus*.]—*Mitt. biol. Reichsanst.* no. 65 pp. 96–98. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 556. Stuttgart, 1942.)

Detailed descriptions are given of the intracellular path followed in plant tissue by the sucking bristles of *Aspidiotus perniciosus*, Comst., and of the effect of the puncture.

Nitsche [G.] & Foerster [H.]. **Rübenblattwanze.** [The Beet Leaf Bug.]—*Mitt. biol. Reichsanst.* no. 65 pp. 98–99. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 556. Stuttgart, 1942.)

Of adults of *Piesma quadratum*, Fieb., collected in summer and autumn from beet suffering from leaf-crinkle disease in Germany, very few transmitted the virus [*Savoia betae* of Holmes] in autumn, but 99 per cent. did so immediately after hibernation. Nymphs from infected plants did not transmit the virus, but the adults resulting from them did so after hibernation though they had fed exclusively, in the adult stage, on uninfected seedlings.

Maercks (H.). **Wiesenschnaken.** [Tipulids.]—*Mitt. biol. Reichsanst.* no. 65 pp. 100-101. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 556–557. Stuttgart, 1942.)

In the higher moorlands of north-western Germany, *Tipula paludosa*, Mg., which overwinters in the larval stage, decreased greatly in abundance after the hard winter of 1939–40, but *T. czizeki*, de Jong, which hibernates in the egg stage in wet grassland on low-lying moors, was still numerous in 1940. A bait of sodium fluoride and wheat bran was ineffective against *T. paludosa*, even at high dosages, but mixtures of 1 part sodium fluosilicate, barium fluosilicate or Paris green and 5 parts bran are stated to have been effective [but *cf.* next abstract], even against the older larvae. Calcium cyanamide, at the rate of about 180 lb. per acre, gave good results against the eggs and young larvae.

Maercks (H.). **Ueber die Wirkung von Kleieködern und Mineraldüngemitteln auf die Larven der Sumpfschnake** (*Tipula paludosa* **Meig.**). [On the Effect of Bran Baits and Mineral Manures on the Larvae of *T. paludosa*.]—*Arb. physiol. angew. Ent. Berl.* **8** pp. 101–112. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 567. Stuttgart, 1942.)

In tests of bran baits against the larvae of *Tipula paludosa*, Mg., the percentage mortalities given by a mixture of Paris green and bran (1 : 25) were 89, 90 and 67 for the first three instars, respectively; satisfactory mortality of the fourth-instar larvae was obtained only by increasing the ratio of poison to 1 : 5. Sodium fluoride and sodium fluosilicate are stated to have proved unsuitable [*cf.* preceding abstract], but a proprietary poison bait (Pertipan) containing fluorine was more effective than Paris green. Baits are effective only if the soil is sufficiently damp and is free from frost [*cf. R.A.E.*, A **27** 520], but they should be applied before the larvae complete the third instar at the beginning of spring.

Maercks (H.). **Ueber Biologie und Schädlichkeit der Herbstschnake** (*Tipula czizeki* **de J.**). [The Biology and Harmfulness of *T. czizeki*.]—*Arb. physiol. angew. Ent. Berl.* **8** pp. 197 205. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 566. Stuttgart, 1942.)

In 1939 and 1940, *Tipula czizeki*, de Jong, caused serious injury to grass in the low-lying moorlands on the Wümme near Bremen, which are flooded in winter and are chiefly covered by *Agrostis alba prorepens*. The eggs overwinter in very damp places, are able to survive repeated freezing, and begin to hatch at the end of April. The fourth-instar larvae, which require the most food, are present from the end of June to mid-September, and the adults from early October to November. Four females laid an average of 455 eggs each. *T. czizeki* has been observed in various localities in north-western and central Germany.

Speyer (W.). *Endopsylla ? agilis* **de Meijere (Cecidomyidae) als Entoparasit von** *Psylla mali* **Schmidb.** [*Endopsylla ? agilis* as an Endoparasite of *P. mali*.]—*Arb. physiol. angew. Ent. Berl.* **8** pp. 39–41. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 567. Stuttgart, 1942.)

In the hilly ground near the sea coast between the Elbe and the Weser an average of 19 per cent. of the adults of *Psylla mali*, Schm., on apple are parasitised by a species of *Endopsylla*, probably *E. agilis*, de Meij., which was originally described from *Psylla foersteri*, Flor, on alder. The eggs, which are usually laid on the wings of the Psyllid, hatch in a fortnight, and the larvae leave the dying host, drop to the ground and pupate on the surface of the soil [*cf. R.A.E.*, A **22** 603]. The pupal stage lasts at least six days. As eggs can be found from June to September and the first mature larvae in late June, there are possibly two generations a year. Parasitised females of the Psyllid are rendered sterile.

Knapp (O.). **Sonnenblumenzüchtung in Ungarn.** [Sunflower Breeding in Hungary.]—*Züchter* **12** pp. 193–199. 1940. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 558. Stuttgart, 1942.)

The Pyralid, *Homoeosoma nebulella*, Hb., is the most serious pest of sunflower in Hungary, and the destruction of plant débris after harvest has given little or no control, but varieties of sunflower resistant to attack have been produced.

Podhradszky (J.). **Chlorpikrin als Pflanzenschutzmittel.** [Chloropicrin as an Insecticide. (*In Magyar and German.*)]—*Mitt. ungar. Gartenbau-Akademie* **7** pp. 116–124. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 571. Stuttgart, 1942.)

In experiments in Hungary, young dormant apple trees that had been grafted a year before and were infested with *Aspidiotus perniciosus*, Comst., were injured by fumigation with chloropicrin, even at concentrations too low to kill the Coccids.

Janecek (M.). **San José-Schildlausbeobachtungen in Oggau am Neusiedlersee während des Sommers 1940.** [Observations on the San José Scale at Oggau on the Neusiedler Lake in the Summer of 1940.]—*Arb. physiol. angew. Ent. Berl.* **8** pp. 145–163. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 559. Stuttgart, 1942.)

The commonest food-plants of *Aspidiotus perniciosus*, Comst., in an Austrian village on the Neusiedler Lake were found to be apple, pear, nut, plum, greengage, morello cherry, peach, quince, lilac, grape vine and box (*Buxus*). In experiments, it infested pine strawberry [*Fragaria grandiflora*], but not tomato, parsley or flowering ornamentals. Observations in 1940 showed that the adults of the overwintering generation paired in the last week of May. The numbers of mature embryos per female averaged 41 for the overwintered generation and 78 for the summer one, but females actually deposited only 32 young on an average, possible owing to unfavourable weather. Crawlers of the two generations were first observed on 22nd June and 7th September, but the dates of their appearance probably vary with the weather. Observations on the effect of infestation on the plants and on the bionomics of the Coccid are described. The predators, *Chilocorus bipustulatus*, L., and *Cybocephalus politus*, Gylh., afforded more control than parasites, which comprised *Aphytis diaspidis*, How., and two unidentified Aphelinids.

Tschermak (L.). **Die Tannenfrage im Wienerwald.** [The Silver-fir Problem in the Wienerwald.]—*Zbl. ges. Forstwes.* **67** pp. 135–151. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 559–560. Stuttgart, 1942.)

In the Wienerwald mountain district near Vienna, stands of silver fir [*Abies*] are heavily infested by the silver-fir shoot Tortricid [*Tortrix murinana*, Hb.] and secondary pests such as *Cryphalus piceae*, Ratz., *Ips curvidens*, Germ., *I. spinidens*, Rttr., and *Pissodes piceae*, Ill.

Schulze (K.). **Massenauftreten der Kornmotte** (*Tinea granella* **L.**) **an** *Secale cornutum* **(Mutterkorn).** [A Mass Infestation of *T. granella* on Ergot of Rye.]—*Mitt. Ges. Vorratsschutz* **17** pp. 59–61. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 560. Stuttgart, 1942.)

After 18 months' storage in Germany, the remainder of a sackful of ergot of rye of Portuguese origin was found to be heavily infested by *Tinea granella*, L. The pieces of ergot were eaten from the outside and the crumbs spun together in a web. This drug is therefore an adequate food for the larvae, though its chemical composition differs materially from that of their more usual foods; it contains 30–40 per cent. oil, together with protein and a substance like chitin, but no cellulose or starch.

Schaerffenberg (B.). **Die biologische Bekämpfung des Maikäfers und seiner Larve mit** *Beauveria densa*. [The biological Control of the Cockchafer and its Larva by *Beauveria densa*.]—*Anz. Schädlingsk.* **17** pp. 53–55. 1941. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 563. Stuttgart, 1942.)

The author attributes the failure that has attended attempts to control the larvae of *Melolontha* by means of *Beauveria densa* to the divergent soil conditions required by the two organisms, and considers that the fungus can be of value in damp forest soil rich in humus. Mass increases of the beetle, however, occur chiefly in dry, sandy soil. Laboratory experiments showed that infection succeeded more readily in damp humus soil than in dry sandy soil.

Jancke (O.). **Neue Wege zur Bekämpfung des Baumweisslings.** [New Means for the Control of *Aporia crataegi*.]—*NachrBl. dtsch. PflSchDienst* **22** pp. 23–24. 1942. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 565. Stuttgart, 1942.)

In an experiment at Bad Dürkheim in 1940, mirabelle plum trees infested by *Aporia crataegi*, L., were sprayed with 1·5 per cent. tobacco extract and 0·5 per cent. soft soap or 0·1 per cent. of a wetting agent or with a commercial insecticide containing nicotine. The sprays were applied as soon as the eggs began to hatch, and killed most of the eggs, so that only a few winter nests were formed. Tobacco extract with the wetting agent gave the best results. In July 1941, all the treated trees were in full leaf, whereas unsprayed trees had been completely defoliated.

Loewel (E. L.). **Erfahrungen und Beobachtungen mit dinitroorthokresolhaltigen Winterspritzmitteln.** [Experience and Observations with Winter Sprays containing Dinitro-ortho-cresol.]—*Dtsch. Obstbau* **57** pp. 21–22. 1942. (Abstr. in *Z. PflKrankh.* **52** pt. 12 pp. 575–576. Stuttgart, 1942.)

Dormant sprays containing preparations of dinitro-ortho-cresol have recently come into general use in the Altenland orchard district, on the Lower Elbe. Experience has shown that they are highly effective against leaf Aphids, Coccids,

Argyresthia ephippella, F., *Operophtera brumata*, L., and Tortricids and, if not applied too early, give fair control of *Anthonomus pomorum*, L., but are of no value if used alone against *Eriosoma lanigerum*, Hsm., or eggs of *Paratetranychus pilosus*, C. & F. They injure flower buds, undergrowth and grass less than do tar distillates, but are toxic to earthworms, which aerate the soil. A satisfactory spray can be prepared with 1 per cent. of a commercial paste or 0·5 per cent. of a powder containing 50 per cent. dinitro-o-cresol, which dissolves more quickly. If the infestation is severe, the concentration should be increased by half.

Wiesmann (R.). **Weitere Untersuchungen über die Winterbespritzung der Obstbäume.** [Further Investigations on the Winter Spraying of Fruit Trees.]—*Schweiz. Z. Obst- u. Weinb.* **51** pp. 110–124. 1942. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 576. Stuttgart, 1942.)

In experiments in Switzerland, delayed dormant sprays of tar distillate applied to apple were ineffective against the eggs of *Operophtera brumata*, L., and *Aphis pomi*, Deg., which absorb air shortly before hatching and thus resist suffocation. Late sprays also gave incomplete mortality of Tortricids and *Hyponomeuta padellus malinellus*, Zell. As sprays for the control of scab should be applied as late as possible and those for the control of insects are more effective when applied earlier, the author considers that a combined spray is not advisable and recommends that a tar distillate should be applied not later than mid-March against insects and treatment against scab when the buds shoot. The treatment with tar distillate can be omitted in districts in which insect attack is slight and winter spraying has been regular. In experiments, two preparations of dinitro-ortho-cresol were completely effective against *O. brumata*, *Hyponomeuta* and Tortricids, and should be suitable for combined sprays for late application.

Kemper (H.). **Ueber die insektizide Wirksamkeit des Tritox.** [On the insecticidal Effect of Tritox.]—*Z. hyg. Zool. SchädlBekämpf.* 1941 pp. 21–30. (Abstr. in *Z. PflKrankh.* **52** pt. 12 p. 576. Stuttgart, 1942.)

In the experiments described, fumigation with Tritox (trichloracetonitrile) gave good results against adults of *Calandra granaria*, L., *Sitodrepa panicea*, L., and *Bruchus obtectus*, Say, and larvae of *Tenebrio molitor*, L., and *Ephestia kuehniella*, Zell. Trichloracetonitrile is a clear volatile non-inflammable liquid that is relatively harmless to man. Its vapour has great penetrating power, so that spaces that are to be fumigated must be closely sealed.

Eidmann (H.). **Zur Kenntnis des Buchenspringrüsslers** *Orchestes* (=*Rhynchaenus*) *fagi* **L.** [A Contribution to the Knowledge of *R. fagi*.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 42–61, 13 figs., 48 refs. Stuttgart, 1943.

An account is given of observations near Hanover in 1942 on the bionomics of *Rhynchaenus* (*Orchestes*) *fagi*, L., on beech, the results of which are in substantial agreement with those of Eckstein [*R.A.E.*, A **12** 458]. A list compiled by Fulmek of the parasites recorded from this weevil is included. The author bred five parasites from it in June; two were Ichneumonids that somewhat resembled *Ephialtes* (*Pimpla*) *sagax*, Htg., and *E.* (*P.*) *detritus*, Hlmgr., and three were Chalcidoids. A cocoon of *R. fagi* contained the remains of the host pupa, the pupa of a Chalcidoid and an active Cecidomyiid larva, probably an inquiline. As the larva of the weevil is protected by its mine, mortality due to weather conditions is slight.

MEYER (E.). **Weitere Untersuchungen zur Rapsglanzkäferbekämpfung mit chemischen Mitteln.** [Further Investigations on Chemical Measures against *Meligethes aeneus*, F.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 62–73, 3 figs., 9 refs. Stuttgart, 1943.

Experiments were carried out at Bonn in 1942 in an attempt to discover a substitute for the derris dust containing 0·8 per cent. rotenone (K mex) that has been found effective against *Meligethes aeneus*, F., on rape [*cf. R.A.E.*, A **30** 539, 541], and also to test the effect of diluting this dust. All treatments were made at a rate equivalent to 6 oz. per 100 sq. yds. In the laboratory tests, which were carried out with the aid of the Görnitz balance [**21** 385], the dusts were applied to beetles collected from the field, and they were kept with an undusted rape plant under conditions of high humidity to protect paralysed individuals from desiccation. Kümex gave 100 per cent. mortality in two days when undiluted, and 100 and 92 per cent. in four days when diluted with talc at rates of 1 : 1 and 1 : 3, respectively. To determine how long the dusts remain effective, they were applied to glass dishes and their gauze covers, and beetles were confined in the dishes after various periods. Complete mortality in 24 hours was given by the first two dusts for up to 43 and 38 days, respectively, after application, but the third gave only 65 and 20 per cent. mortality one and five days, respectively, after application. The dusts used in all these tests were ground for one hour in a ball-mill before application, and the value of doing this was shown in a test in which the undiluted dust killed or paralysed all the beetles in eight hours when ground but had not affected some individuals even after 24 hours when unground.

Experiments were carried out in infested rape fields to test the effect on yield of controlling the beetle with contact dusts or the mobile trap of Buhl & Meyer [**27** 511]. The results were somewhat inconclusive, partly owing to unfavourable weather and the natural regenerative power of the plants [*cf.* **31** 226], but they showed in general that treatments should be begun as soon as the first beetles migrate to the plants and that dusted plants tended to flower earlier and more uniformly than undusted ones. The percentage mortalities given by the last two applications were 81 and 80·5 for undiluted Kümex, 88·5 and 92 for another derris dust, and 76 and 66 for a dust of derris and nicotine. The trap caught 61 per cent. of the beetles before the rape flowered and 24 per cent. during flowering. The effect on yield was estimated for Kümex and the trap, and of these the former gave the greater increase and profit.

In laboratory and field tests of four synthetic stomach poisons, the composition of which is not stated, none was as effective as Kümex, though one gave 98 per cent. mortality in five days in the laboratory, and three were superior to the trap in the field.

BERAN (F.). **Die Wirkung von Blausäure auf** *Aspidiotus perniciosus* **Comst.** [The Action of Hydrocyanic Acid Gas on *A. perniciosus*.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 74–80, 1 graph, 8 refs. Stuttgart, 1943.

The apparatus described by Peters & Ganter [*R.A.E.*, A **23** 258] was used in experiments in Vienna on the effect of fumigation with hydrocyanic acid gas on mature females of *Aspidiotus perniciosus*, Comst., on apple and currant twigs. At 18°C. [64·4°F.] complete mortality was given by 0·15, 0·5, 1, 1·5, 3 and 5 oz. HCN per 100 cu. ft. in 400, 120, 54, 36, 17 and 9 minutes, respectively, but not in 380, 90, 48, 30, 16 and 8·4 minutes. The author concludes that, in general, complete mortality would be obtained when the product of the quantity of HCN in oz. per 100 cu. ft. multiplied by the time in minutes is 54. The resistance of *A. perniciosus* to HCN varies with its stage of development and is greatest shortly before the larvae are produced; the females tested were in this stage.

Sachtleben (H.). **Die biologische Bekämpfung und ihre praktische Bedeutung in Deutschland.** [Biological Control and its practical Importance in Germany.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 86–93. Stuttgart, 1943.

The only known case of successful biological control of an insect pest in Germany by an introduced insect is that of the woolly apple aphis [*Eriosoma lanigerum*, Hsm.] by *Aphelinus mali*, Hald. The conditions that favour the success of the method are discussed, and it is concluded that it has only slight prospects in Germany, even in the case of introduced pests, though it might prove of value against *Aspidiotus perniciosus*, Comst., in Austria. Biological control of *Leptinotarsa decemlineata*, Say, on potato, is unlikely, as the beetle has few enemies in its country of origin, and they do not decrease its numbers appreciably. The rearing and distribution of indigenous parasites of pests that are not easily accessible to other means of control might be of some value.

Trappmann (W.). **Pflanzenschutzmittel—gestern, heute und morgen.** [Insecticides and Fungicides in the Past, Present and Future.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 93–106, 5 refs. Stuttgart, 1943.

The author reviews the development of the use of insecticides and fungicides for plant protection, with special reference to Germany, and the conditions that rendered necessary there the regulation and testing of commercial preparations, which was provided for by law in 1937 [*cf. R.A.E.*, A **25** 730]. The work of the German Imperial Biological Institute in this respect is briefly described, and the modifications caused by war conditions in the types of preparations to be manufactured and in the organisation of the industry are discussed. It is considered that it would be desirable to regulate the whole of the European insecticide and fungicide industry in accordance with German standards!

Kaufmann (O.). **Keine Gefährdung der Bienen bei Bestäubung der Rapsfelder mit Derris- und Pyrethrummitteln gegen Rapsglanzkäfer und Kohlschotenrüssler.** [No Danger to Bees through Dusting Rape Fields with Derris and Pyrethrum.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 125–129, 6 refs. Stuttgart, 1943.

Kümex, a derris dust containing 0·8 per cent. rotenone, is widely used in Germany for the control of *Meligethes aeneus*, F., on rape, but it is not usually applied after the plants have begun to bloom for fear of poisoning honey bees. Experiments were therefore carried out in Schleswig-Holstein in 1942 to test the necessity for this precaution. The dust was applied at unusually high rates (up to 63 lb. per acre) and beehives were placed at the edges of the fields. Dusturan, a preparation containing pyrethrum, which is effective against *Ceuthorrhynchus assimilis*, Payk., a pest of flowering rape, was also tested, at 16 lb. per acre. The bees suffered no harmful effects in any of the tests, and the observations of Böttcher [*R.A.E.*, A **27** 231, 402] were thus confirmed.

Börner (C.). **Die Frage der züchterischen Bekämpfung der schwarzen Blattläuse der Kirschen.** [The Question of Control of the Black Aphids of Cherry by Selection of Varieties.]—*Z. PflKrankh.* **53** pt. 1–3 pp. 129–141, **4** refs. Stuttgart, 1943.

Myzus cerasi, F., is a serious pest of cherries in Germany in some years. On sweet cherry [*Prunus avium*], it causes the formation of rosettes of tightly rolled leaves: on sour cherry [*P. cerasus*], the leaves are stunted, but only slightly curled, and the shoots cease to grow. If the Aphids become numerous early in the season, the pedicels are also infested and the young fruits dry up. The fundatrices appear when the buds open and both they and the following generation are wingless. Winged migrants appear in the third generation and

become increasingly numerous in the next 2–3 generations, until in the first half of July very few apterae remain ; these are usually destroyed by predators.

The migrants colonise *Galium* spp., preferably *G. mollugo*, *G. aparine*, *G. cruciatum* and *G. palustre*, and sometimes also *Rubium tinctorum*, and *Veronica*, chiefly *V. beccabunga* and *V. scutellata*. In autumn, winged sexuparae and males appear and fly back to cherry on which the sexual females produced by the sexuparae pair with the males and lay the winter eggs on the buds of the shoots. In addition to *P. avium* and *P. cerasus*, the wild and cultivated *P. chamaecerasus* is also infested, but ornamental cherries of Asiatic and American origin are not.

As some growers believed that certain varieties of sweet and sour cherry are not infested, the author carried out experiments with 75 varieties of the former and five of the latter. His observations showed that no variety was immune from infestation, but Aphids from either species of cherry failed to establish themselves on the other, thus confirming his earlier assumption that two species or biological races are concerned [*R.A.E.*, A **19** 424]. The Aphids on *Veronica* appear to belong exclusively to the sour-cherry form. The author had previously proposed the name var. *pruniavium* for the form from sweet cherry, though he had been unable to find morphological differences between the two varieties, but he here shows that in the spring generations on the winter food-plants differences exist in the ratios between the length of the antennal flagellum and that of the base of the antenna and between the length of the flagellum and that of the siphon. A third character is the length of the proboscis, which is greater in var. *pruniavium*, and this may be related to the difference in the type of injury caused to the two species of cherry, though the latter is more likely to be due to differences in the chemical composition of the saliva.

ZACHER (F.). **Beobachtungen über Verbreitung und Auftreten von Vorratsschädlingen und ihren Begleitformen.** [Observations on the Distribution and Occurrence of Pests of Stored Products and of associate Forms.]—*Z. hyg. Zool. SchädlBekämpf.* **34** pp. 63–78, 3 figs. 1942. (Abstr. in *Z. PflKrankh.* **53** pt. 1–3 p. 154. Stuttgart, 1943.)

It is recorded in this paper that the mite, *Tyrophagus noxius*, Zkhv., hitherto known only from Russia, where it is a serious pest of stored grain [*cf. R.A.E.*, A **26** 95, 96, 97], has been found in several localities in Germany, but has not caused any injury. *Tinea secalella*, Zacher, is parasitised by *Meteorus pulchricornis*, Wesm., *M. atrator*, Curt. (*similator*, Nees) and, probably, *Chremylus rubiginosus*, Nees.

LOEWEL (E. L.). **Rapsglanzkäfer vernichtet Kirschblüten.** [The Rape Beetle destroys Cherry Blossoms.]—*NachrBl. dtsch. PflSchDienst* **21** p. 65. 1941. (Abstr. in *Z. PflKrankh.* **53** pt. 1–3 p. 155. Stuttgart, 1943.)

Meligethes aeneus, F., completely destroyed the blossoms of young sour cherries in northern Hanover in May 1941.

VON SZELENYI (G.). **Die Schildlausparasiten aus der Familie der Chalcididen (Hym.).** [Chalcidoid Parasites of Coccids. (*In Magyar and German.*)] *Mitt. ungar. Gartenbau-Akademie* **7** pp. 176–202. 1941. (Abstr. in *Z. PflKrankh.* **53** pt. 1–3 p. 155. Stuttgart, 1943.)

The author has bred the Encyrtids, *Habrolepis zetterstedti*, Westw., *Phaenodiscus aeneus*, Dalm., and *Cerapterocerus mirabilis*, Westw., from *Lepidosaphes ulmi*, L., *Lecanium prunastri*, Boy., and *Eriopeltis festucae*, Boy., respectively, in Hungary.

Schwartz (M.) & von Winning (E.). **Der Stand der Kartoffelkäferfrage in Europa. I. Das Auftreten des Kartoffelkäfers in Deutschland im Jahre 1941.** [The Position of the Potato Beetle Question in Europe. I. The Occurrence of the Potato Beetle in Germany in 1941.]—*NachrBl. dtsch. PflSchDienst* **22** pp. 33–34. 1942.

Feytaud (J.). **II. Der Kartoffelkäfer in Frankreich 1941 nach Beobachtungen im Südwesten.** [The Potato Beetle in France in 1941 according to Observations in the South-west.]—*T. c.* pp. 38–39.

III. Die Kartoffelkäferbekämpfung im besetzten Gebiet Frankreichs im Jahre 1941. [Potato Beetle Control in occupied France in 1941.]—*T. c.* pp. 45–46.

Roos (K.). **IV. Das Auftreten des Kartoffelkäfers in der Schweiz im Jahre 1941.** [The Occurrence of the Potato Beetle in Switzerland in 1941.]—*T. c.* pp. 49–51. (Abstrs. in *Z. PflKrankh.* **53** pt. 1–3 pp. 155–156. Stuttgart, 1943.)

In the first, second and fourth of these papers, the position with regard to *Leptinotarsa decemlineata*, Say, in 1941 in Germany [*cf. R.A.E.*, A **31** 181], south-western France [**31** 81] and Switzerland [**31** 180] is reviewed. In the third it is stated that the beetle caused very little damage to potato in occupied France owing to the organisation of its control. The cultivation of potatoes was concentrated in large unified areas, the collection of larvae and adults was organised, and arsenical sprays were applied. Although at least 280 tons of larvae and adults were collected, sprays were still required at the end of June, and usually three applications were made. About 17,000 tons of calcium and lead arsenates were used.

Blunck (H.) & Meyer (E.). **Zur Rapsglanzkäferbekämpfung mit chemischen Mitteln.** [The chemical Control of the Rape Beetle.]—*Anz. Schädlingsk.* **17** pp. 102–107. 1941. (Abstr. in *Z. PflKrankh.* **53** pt. 1–3 p. 158. Stuttgart, 1943.)

Derris dusts have proved effective against *Meligethes aeneus*, F., on rape in Germany, and some of them are inexpensive. In dry weather their toxic effect continues for at least three days, but 0·2 in. of rain suffices to wash off the dust layer. In one test, 10 applications of Kümex [a dust containing 0·8 per cent. rotenone] were necessary owing to bad weather, but even so the measure was profitable.

Börner (C.) & Schilder (F. A.). **Die Verbreitung der Reblaus in Deutschland nach dem Stande des Jahres 1940.** [The Distribution of *Phylloxera* in Germany in 1940.]—*NachrBl. dtsch. PflSchDienst* **21** no. 7, suppl. pp. 1–12. 1941. (Abstr. in *Z. PflKrankh.* **53** pt. 1–3 p. 159. Stuttgart, 1943.)

Owing to shortage of staff, reliable records of the distribution of *Phylloxera* on vines in 1940 could not be obtained. Of the samples received from Germany, 125 belonged to the race with a long proboscis and only 9 (all from Baden) to the race with a short proboscis. Both forms occur in Alsace and in Austria.

Estler (W.). **Die mit der Verwendung von Quarzmehl und Quarzmehlpräparaten bei der Kornkäferbekämpfung verbundenen Gesundheitsgefahren.** [The Danger to Health involved in the Use of Quartz Dust or Preparations of Quartz Dust against the Grain Weevil.]—*Reichsgesundheitsblatt* **17** pp. 357–359. 1942. (Abstr. in *Z. PflKrankh.* **53** pt. 1–3 pp. 159–160. Stuttgart, 1943.)

Of recent years, quartz dusts have been marketed in Germany for the protection of stored grain against *Calandra granaria*, L.; they are added to the grain

at the rate of 1–2 per cent. [*R.A.E.*, A **24** 342] or placed in a ring round it. Inhalation of such dusts, however, is liable to lead to silicosis, and since March 1941 their use in grain stores has been prohibited.

JEWETT (H. H.). **Life History of the Wireworm** *Aeolus mellillus* (**Say**).—*Bull. Ky agric. Exp. Sta.* no. 425, 11 pp., 4 figs., 7 refs. Lexington, Ky., 1942.

The author describes all stages of *Drasterius* (*Aeolus*) *mellillus*, Say, the larvae of which injure tobacco, maize, wheat, grasses, and other crops, and gives a detailed account of further investigations on its bionomics in Kentucky in 1940–41 [*cf. R.A.E.*, A **29** 363, 482] and of methods of rearing it in the laboratory. No males have been observed in central Kentucky, and about 95 per cent. of the eggs laid by females hatched. Caged adults deposited eggs on the soil surface or on litter on the soil at irregular intervals; some did not oviposit. The egg stage lasted 7–18 days. Most of the larvae that developed from eggs laid in spring and early summer by overwintered adults or adults that developed from overwintered larvae gave rise to adults in the same season. The remainder overwintered, as did those hatching from eggs laid at midsummer or later by overwintered adults, adults from overwintered larvae and adults of the summer generation. The larval stage of the summer generation lasted 36–82 days and that of the overwintering larvae 248–350 days; the pupal stage lasted 8–23 days. Overwintered adults consisted of adults of the first generation and those that developed from overwintered larvae of the first and second generations of the previous season. Some survived until the following November, but none lived through a second winter in the adult stage. They oviposited from May to September, and adults that developed from overwintered larvae before 20th June in 1940 and before 9th August in 1941 from May to August and June to August, respectively, but those that emerged later did not oviposit until the following year. First-generation adults did not oviposit in 1940, but those that appeared before 9th August in 1941 oviposited between 30th July and 6th September.

Overwintered larvae cause the heaviest damage to spring-planted crops, as they are larger than those from eggs laid in spring. As most of the overwintered larvae pupate by about 30th June in central Kentucky, late-planted crops are more likely to escape heavy injury than earlier ones. Also, as unploughed sod is preferred for oviposition, which begins about 1st May, crops planted on sodland that is ploughed early in spring are less likely to be injured than those on late-ploughed sodland. Keeping cultivated land free from grass during the first year following sod and sowing small-grain cover crops late in autumn will largely prevent infestation with larvae during the second year.

PACKARD (C. M.) & CARTWRIGHT (W. B.). **The Hessian Fly in Indiana.**—*Bull. Ind. agric. Exp. Sta.* no. 440, 15 pp., 5 figs., 1 ref. Lafayette, Ind., 1939. [Recd. 1943.]

In view of the fact that the hessian fly [*Mayetiola destructor*, Say] is the most destructive pest of wheat in Indiana, the authors briefly review its life-history, the character of the injury it causes and the control measures recommended against it, all of which are similar to those described from other parts of the United States [*R.A.E.*, A **24** 254]. Experiments in 1918–35 on the effect of the date of sowing in autumn on infestation are described, and the relation between sowing date and annual trends of infestation, autumn and spring infestations and yield are shown in tables. It is concluded that wheat is more heavily infested when it is sown early and gives better yields in outbreak years when it is sown on or after the safe dates, and that general adherence to the safe dates every year is essential to prevent losses, since the fly can build extremely high and injurious populations from low ones within a single year.

Hill (C. C.), Udine (E. J.) & Pinckney (J. S.). **A Method of estimating Reduction in Yield of Wheat caused by Hessian Fly Infestation.**—*Circ. U.S. Dep. Agric.* no. 663, 9 pp., 2 graphs, 1 ref. Washington, D.C., 1943.

The following is substantially the authors' summary : The results are given of a study to determine the reduction in yield of wheat due to different degrees of infestation by *Mayetiola* (*Phytophaga*) *destructor*, Say, during the spring growing season. In 13 wheat fields from New York to North Carolina, the relationship was ascertained between the number of puparia in the culm and the weight of grain per head, with the consequent loss in yield in bushels per acre resulting from any given degree of infestation. Any preference that the flies may have for ovipositing on the weaker plants in spring was shown to be negligible as a factor modifying the results of these deductions. Cage experiments in which the degree of infestation was controlled demonstrated that the fly may cause considerably more loss than that due solely to the lessened development of the grain [*cf. R.A.E.*, A **13** 241], so that estimates of losses due to that factor alone are considered very conservative. From the assembled data, a table is prepared showing the losses resulting from different percentages of productive culms infested in the spring. The losses rise from 0·04 to 15·7 bushels per acre as the percentage of the productive culms infested rises from 1 to 100.

Finney (D. J.). **The statistical Treatment of toxicological Data relating to more than one Dosage Factor.**—*Ann. appl. Biol.* **30** no. 1 pp. 71–79, 2 figs., 14 refs. London, 1943.

The following is the author's summary. Experiments on the biological measurement of toxicities, and others requiring the use of the probit transformation in the statistical analysis, have in the past been largely of a unifactorial nature. In order to reach a fuller understanding of the action of insecticides and other poisons it is necessary that experiments be performed in which two or more factors relating to the dosage are subjected to variation. Bliss has recently described methods for the analysis of two-factor experiments [*cf. R.A.E.*, A **29** 433], but his technique is not a direct extension of the simple case for the fitting of a probit regression line, nor will it generalise easily when more factors are involved. In the present paper it is shown that probit regression planes and hyper-planes can be fitted in a way exactly analogous to that used for the regression line. Tests of heterogeneity and of parallelism, and standard errors of parameters are readily derived. The notion of relative potency of two poisons does not extend so easily, and it is suggested that the mean probit difference should be used in its stead as a measure of their relative effectiveness. As in the unifactorial analysis, the routine of fitting the regression equations may be repeated until satisfactory accuracy in the estimation of the parameters is attained, but usually one, or at the most two, cycles of the process gives values sufficiently near to the maximum likelihood solution for practical purposes.

A more general class of equations is introduced for use when the probit mortality is linearly related to each dosage factor separately, but the individual effects are not additive. The suggestion made by Bliss for this case [*cf. loc. cit.*] lacks symmetry and does not completely fulfil the linearity conditions, but the present proposal avoids these defects and permits the making of tests for the significance of the improval in fit effected by the additional parameters.

The arithmetical procedure for the fitting of a probit plane is described in detail for data on the toxicity to *Tribolium castaneum*, Hbst., of a pyrethrin oil spray at various levels of concentration and deposit weight. Two methods of applying the poison were compared in this experiment, and the two series of results were excellently fitted by parallel probit planes. Direct spraying gave

slightly, but not significantly, higher kills than the film method of application [**31** 85], and under the particular conditions obtaining, increasing the concentration of pyrethrin in the sprays was a far more effective means of increasing kill than was a proportionate increase in the total amount of spray available to the insects. Numerical examples used by Bliss are also discussed in relation to the methods of fitting and forms of equation given in this paper.

STANILAND (L. N.). **A Survey of Potato Aphides in the South-western Agricultural Advisory Province.**—*Ann. appl. Biol.* **30** no. 1 pp. 33–42, 9 figs., 12 refs. London, 1943.

The results are given of a survey of populations of *Myzus persicae*, Sulz., on potatoes in Devon and Cornwall, carried out during 1937–41 with a view to finding suitable areas for the production of virus-free seed potatoes. The numbers of winged, wingless and parasitised individuals on a random sample of 100 leaves across each field were counted, and the percentage of leaves infested was noted. The relative humidity and the direction and force of the wind at the time of counting, the variety of potato, the aspect and height above sea-level of the field and the proximity of winter food-plants were recorded. One or more counts were made at 107 centres, and their altitudes and populations of *M. persicae* are shown on a map. This Aphid was found at 70 centres ; the highest count per 100 leaves was 609, but a population of 100 per 100 leaves was exceeded at only seven centres, of which one (a market garden) was in the area considered to be the most suitable for seed production. Winged forms began to appear during May or June, the peak of infestation occurred mainly in July, though it was as late as August in some exposed situations, and winged forms appeared again during August and September. Parasitism was variable, but fairly heavy in some instances. Apterae were found during the winter on cultivated crucifers, and were commonest on savoys and brussels sprouts, of which the former was by far the most favoured food-plant. Other winter food-plants of special importance in Devon and Cornwall were anemones and violets, both of which are grown commercially for flower production in various districts. Populations were higher on potatoes near winter food-plants than on isolated ones, particularly in years of heavy infestation. They were generally low in the more humid districts and those that have heavy rainfall or are exposed to wind, but were not directly affected by altitude. It is concluded that in these counties, seed potatoes should be grown where humidities are frequently high and there is much exposure to winds, particularly moist westerly winds, and should be isolated from areas in which crucifers are grown on a large scale and also from anemones and violets. Four suitable areas are shown on a map.

Observations on other Aphids present on potato, which were not counted, indicated that *Macrosiphum solanifolii*, Ashm., was often plentiful and occurred at low and high altitudes and in the north and south of both counties ; *Aphis rhamni*, Boy., occurred less frequently, but produced some of the heaviest populations and was found at a great variety of altitudes and in widely separated districts ; *M.* (*Myzus*) *solani*, Kalt., was never very numerous, but was recorded at 25 centres ; *A. fabae*, Scop., was found at 33 centres, the populations being fairly large in a few cases ; and *Myzus ornatus*, Laing, was found on potato at a few centres, usually in the neighbourhood of other food-plants, but gave negative results in transmission experiments [*cf. R.A.E.*, A **28** 276].

Discussion on Potato Virus Diseases.—*Ann. appl. Biol.* **30** no. 1 pp. 80–108, 11 figs., 15 refs. London, 1943.

In Potato Virus Diseases : Introduction (pp. 80–82), G. Samuel discusses the importance of these diseases in England, the production of healthy seed potatoes in Scotland and Ireland, the factors involved in the degeneration of the stocks

in England, and the certification of " once-grown " English seed potatoes from a good stock containing less than 3 per cent. leaf-roll [*Corium solani* of Holmes] and virus Y [*Marmor cucumeris* var. *upsilon* of Holmes] and isolated more than 50 yards from other potatoes infected with these diseases.

In Some Properties of the Potato Viruses (pp. 82–83), F. C. Bawden discusses the symptoms, properties, including method of transmission, and relative importance of leaf-roll, virus X [*Marmor dubium* var. *vulgare* of Holmes] and virus Y, the only three of the 20 known potato viruses that are important in the British Isles. Virus Y is transmitted by the Aphids, *Myzus persicae*, Sulz., *Aphis rhamni*, Boy. [*cf. R.A.E.*, A **31** 501] and *Macrosiphum solanifolii*, Ashm. (*gei*, auct.) and leaf-roll by *M. persicae*, but no vector of virus X is known ; X and Y are readily transmitted mechanically, but leaf-roll is not. In the field it is common for only one of the two Aphid-transmitted viruses to spread at a time, possibly because of differences in their relation to their vectors. Aphids must feed for a considerable time to acquire the leaf-roll virus and do not become infective for a day or two, but they then remain infective for relatively long periods, whereas they can transmit virus Y immediately after feeding on an infected plant, but those that feed continuously, either before or after access to an infected plant, lose their infectivity in a few minutes while others remain infective for some hours [*cf.* **28** 301, etc.]. Apterous Aphids, which spend long periods on individual plants, are therefore most suitable for spreading leaf-roll and winged migrants, which alight to feed for only short periods, are most likely to transmit virus Y. These two viruses are responsible for the rapid degeneration of potato stocks in the south and east of England, and seed potatoes from Scotland and Ireland are superior because they are relatively free from them, but except for varieties that die when attacked by the more common strains of virus X, they are usually widely infected with this virus, which seems to spread as readily in Scotland and Ireland as in England. It has been shown that healthy plants can become infected if their leaves are rubbed against infected ones, but there is some doubt whether this can account for all infections, and at present it is impossible to define conditions in which spread will not occur.

In Some practical Difficulties in the Production of Virus-free Seed Potatoes (pp. 84–85), K. M. Smith discusses the importance of obtaining really virus-free material of new potato varieties as they appear, the unpredictable occurrence of virus X, the occasional entry of insects into screened glasshouses, and the virtual impossibility of obtaining satisfactory isolation for stocks grown out of doors.

Experience in the last 15 years, described by T. Whitehead in Some Factors influencing the Health of Seed Potato Stocks in North Wales (pp. 85–96), shows the value of continuous Aphid and virus-disease records and the intimate relationship between them, and that a national survey along these lines would be justified on both scientific and practical grounds ; the importance of a high standard of health in the seed potatoes planted, without which other precautions, such as roguing and relative isolation of crops are ineffective, even with moderate Aphid infestations ; and that good seed-growing areas are characterised by exposure to strong winds, lack of facilities for the overwintering of the Aphids, and low and late Aphid attacks, with a corresponding scarcity of alate forms. A programme for the development and certification of stocks is suggested.

In Ecology of Potato Aphides in North Wales (pp. 97–101), I. Thomas and F. H. Jacob describe further investigations [*cf.* **24** 551 ; **29** 590, etc.] carried out in 1939–40. The method of counting populations was slightly modified by substituting a top, middle and bottom leaf from each of 50 plants taken at random for 100 leaves taken at random, the index figure being still the number

of Aphids per 100 leaves. Beating 50 plants at random was also tested but gave counts of 30, 55, 50 and 2 for *Macrosiphum solani*, Kalt. (*Myzus pseudosolani*, Theo.), *Myzus persicae*, *Macrosiphum solanifolii* and *Aphis rhamni*, respectively, as compared with 3, 97, 19 and 113 obtained by counting 150 leaves in the same crop. *M. solani* readily falls off a leaf when disturbed, but *A. rhamni* is difficult to dislodge by beating.

M. solanifolii was not observed on roses, on which it is commonly supposed to overwinter, but it was found to overwinter on strawberry in considerable numbers in the egg stage; a few apterae may also overwinter on strawberry. The eggs hatch in late March or early April, and the population increases to a maximum at about mid-May, when large numbers of alates are produced. These migrate to other plants and are generally found on potatoes in late May or early June, soon after they appear above ground. *M. solanifolii* also overwinters in large numbers in glasshouses. Of the winter food-plants of *A. rhamni*, *Rhamnus cathartica* was found only along the Cheshire border; *R. frangula* was commoner, but no eggs were found on it. The Aphid migrates from *Rhamnus* to potato in early June on the Cheshire border, and the population increases to a peak between the end of July and mid-August. In some years very high populations develop rapidly, and there is widespread distribution by winged forms to other potato crops, the Aphid eventually migrating to the west right across North Wales. *A. rhamni* was also found on nasturtium [*Tropaeolum*] and *Symphytum officinale*.

In The Life History of *Aphis* (*Doralis*) *rhamni* B.d.F. in eastern England (pp. 101–104), J. P. Doncaster states that this Aphid, which is the commonest one on potato in eastern and southern England, has been found to transmit virus Y almost as readily as *Myzus persicae* [*cf.* **31** 501]. The eggs are laid on buckthorn (*Rhamnus cathartica* and *R. frangula*) in autumn and hatch during the second half of April; a brood of wingless females develops, which give rise to two or more generations of Aphids, some of which are winged. The spring migrants move to potato between mid-June and mid-July; they are probably carried by wind to a considerable extent, since potato crops near buckthorn are not appreciably more heavily infested than others. They appear to alight on a plant to feed for a short time, during which young may be produced, after which they fly to other plants and repeat the process. Their progeny reproduce rapidly, forming colonies of wingless females, which tend to remain concentrated on single plants or small groups of plants. Apterous Aphids that are forced to move because of overcrowding or the withering of the leaves may move up the plant to fresh leaves, or to neighbouring plants in the same row. Infestation spreads rapidly throughout the crop. From about the middle of July, winged Aphids develop and migrate to other potato plants in the same field or to neighbouring crops, the peak period for the production of dispersal migrants coinciding with the peak of the infestation as a whole. The winged sexuparae that produce the apterous oviparae, and the winged males, which pair with the latter, migrate to buckthorn in late summer and early autumn. No correlation was found between the density or duration of development of *A. rhamni* and the locality or potato variety, with the possible exception of King Edward, which is frequently more heavily infested than other main crop varieties. Both the rate of growth and the rate of reproduction are increased by high temperatures. Braconid parasites and the predacious larvae of Syrphids, Chrysopids and Coccinellids give local control, but do not prevent the development of the infestation as a whole.

The Spread of Potato Virus Diseases in the Field (pp. 104–105), by P. H. Gregory, is a preliminary account of work begun in 1940 to determine the factors influencing the rate of degeneration of potato stocks in the ware-growing districts of England, where the seed-size progeny of a crop is often used for planting again. There was no constant relation between the populations of

Myzus persicae or *Aphis rhamni* and the spread of either leaf-roll or virus Y, and local factors controlling Aphid movement must be important ; for example, the percentage of plants affected with leaf-roll did not increase after July in fields in which the haulm remained small and compact, whereas large increases in August and early September were recorded where the foliage was sprawling and densely interlacing, probably facilitating the movement of Aphids from plant to plant. It was found that with increasing distance from a badly diseased stock, the amount of virus infection transmitted to a healthy stock falls off steeply at first but more gradually later.

Smee (C.). **Tobacco Aphis.**—*Nyasaland agric. quart. J.* **3** no. 2 pp. 5–7. Blantyre, 1943.

The author points out that control of the tobacco aphis [*Myzus persicae*, Sulz.] in Nyasaland by the eradication of the two wild food-plants [*Cleome monophylla* and *Gynandropsis pentaphylla*] suggested in previous papers [*R.A.E.*, A **31** 155, 233] is not possible, since they are used by the natives as food, one being planted for this purpose, the Aphid is known to attack many other plants, including vegetables and ornamentals that are grown in Nyasaland, and it has recently been found in the Southern Province on two more weeds that are fairly common in cultivated lands. Furthermore, the connection between infestation on *C. monophylla* and *G. pentaphylla* and on tobacco in nurseries or in the field has not been definitely established. No authentic record of the presence of this Aphid on these weeds earlier in the season than mid-January is known, and tobacco on an estate in the Southern Province was infested by that date in 1939 although *C. monophylla* was not. In November 1942, when small numbers of *M. persicae* were present in nurseries at Zomba Station, very small seedlings of *C. monophylla* close at hand were infested by a few immature Aphids that it was not possible to identify, but 130 larger plants growing farther afield were not attacked. The plants on the Station were not destroyed, and *M. persicae* did not appear on them until the end of January, when the Aphids present included a few alates and tobacco in the field was already infested. Well-grown plants of *C. monophylla* near tobacco nurseries in another district in which *M. persicae* was fairly abundant were not infested in December. The Aphid was first reported on the two recently-discovered wild food-plants in mid-December. It was first observed on *G. pentaphylla* in the Northern Province in early February.

Progress Reports from Experiment Stations Season 1941 42.—Med. 8vo., 183 pp., 1 fig. London, Emp. Cott. Gr. Corp., 1943. Price 3*s*.

The pests of cotton occurring at various Experiment Stations during 1941–42 are discussed as in previous years [*R.A.E.*, A **31** 30, etc.]. F. R. Parnell & D. Macdonald (pp. 28–45) report that damage from bollworms and stainers [*Dysdercus*] was negligible at Barberton, South Africa, and that Jassids were abundant only on susceptible varieties of cotton. Jassid-resistance in crosses appears to be correlated with the presence of hairs on the leaf lamina, irrespective of their presence on the stem or petiole, and to increase with their density ; some plants with glabrous stems and hairy leaves were highly resistant. Experience indicates that the susceptibility of a plant increases with the age and number of fruits upon it. Jassid damage to *Gossypium hirsutum* appeared to vary inversely with the hairiness of the petiole, which is closely associated with that of the stems and leaves. In *G. mustelinum* and a hybrid of *G. tomentosum*, the hairs on the petioles were so short and so dense (244 and 329 per sq. mm., respectively) that they were hardly apparent to the naked eye ; infestation was greater on the latter, since the hairs were so curled and matted that both adults and nymphs could easily move over them.

G. S. Cameron (p. 66) reports from Southern Rhodesia that insects caused little damage during the year and suggests that this may have been due to the prohibition of rationing. The reduced importance of Jassids is also due to the use of resistant strains of cotton. The American, Sudan and spiny bollworms [*Heliothis armigera*, Hb., *Diparopsis castanea*, Hmps., and *Earias*] were all present at the same time in very small numbers, but caused little loss, probably because cotton was planted early. Dry weather probably reduced injury by *Dysdercus fasciatus*, Sign., *D. intermedius*, Dist., and *D. superstitiosus*, F., which all occurred in small numbers from February until April. Termites again caused considerable damage towards the end of the season.

J. D. Jameson (pp. 97–103) reports that at Serere, Uganda, the growth of cotton interplanted with tepary beans [*Phaseolus acutifolius* var. *latifolius*] was markedly retarded, and that injury by *Lygus* was less on these plants than on normal ones. In manurial trials, applications of cotton-seed were followed by increased damage, which appears to be associated with the succulence and nitrogen status of the plant [*cf.* **31** 32].

Reports are given from three stations in Tanganyika Territory. J. E. Peat (pp. 113–114) states that attack by Jassids at Ukiriguru was the most widespread and injurious ever recorded, and contrary to previous experience, was very severe in two districts where growing conditions were favourable. Jassids were of no importance where rainfall was lower. *H. armigera* was injurious at Ukiriguru in early March, and it is thought that populations were built up on early maize, of which more than usual was sown in consequence of heavy early rains, or on pigeon pea [*Cajanus cajan*]. There was only one generation and damage was local. Loss was most severe on large plants, and in some cases the yield from them was smaller than from small plants on poor soil. The bottom crop was lost, and the crop that followed it was late. The lateness of the crop probably reduced damage by *D. superstitiosus*, *D. nigrofasciatus*, Stål, *D. fasciatus* and *D. cardinalis*, Gerst., which was less on crops on good soil than on poor. Capsid damage occurred on plants on heavy low-lying land, on which hairy strains gave the highest yields, and to some extent on light hill soil. It is thought that Capsids were more injurious than was at first thought, since the loss of buds and growing points may be overlooked.

A. N. Prentice reports from the Lubaga Station, Shinyanga (pp. 126–129) that the yield from some strains of cotton was considerably reduced by Jassids, which were, however, in general not abundant. Nymphs were present from January to June, but their numbers fluctuated considerably. These fluctuations may reflect varying conditions for *Empoasca facialis*, Jac., but may also indicate the presence of more than one species. In April, *E. benedettoi*, Paoli, was found to be present, but in smaller numbers. Attack by *Dysdercus* spp. was on the whole very heavy. *D. cardinalis* was the commonest early in the season but it was later equalled by *D. fasciatus*; *D. superstitiosus* and *D. nigrofasciatus* occurred in small numbers. The percentage of stained bolls at harvest does not give an accurate indication of stainer attack, since bolls that are attacked when young do not develop. Of every 100 flowers in a field where attack was medium, only 22 produced bolls, and of these 10 were stained. In district trial plots, the percentage of stained bolls ranged from 7 to 29 on black loams, 9 to 93 on red loams, 6 to 66 on sandy soils, and 0 to 43 on black soil in areas liable to water-logging. *Calidea dregii* var. *apicalis*, Schout., appeared suddenly on cotton in large numbers in mid-February and disappeared equally suddenly in early April without breeding; this Pentatomid presumably adds to the staining damage and is not attracted to cotton-seed traps. *H. armigera* was in general not abundant, but there was a short, exceptionally severe, attack on one part of the Station farm in March, when *Earias* spp. were also numerous. No early maize was grown but populations of *H. armigera* may have built up on *Cajanus cajan*. A. H. McKinstry & A. G. Bobbington report from Kingolwira

(pp. 132–133) that early crops in the Eastern Province, especially those in the principal maize-growing areas, were damaged by *H. armigera* in 1941, but the plants recovered and heavy yields of clean cotton were obtained. Damage by *Dysdercus* was most marked on early crops, and populations seemed to decrease during the year. Capsids were injurious only in the wetter parts of the Kilombero valley, where weeds were abundant. Damage by *Helopeltis* was serious in one small area and the pink bollworm [*Platyedra gossypiella*, Saund.] was numerous in a few places. In 1942, insect attack was widespread, but very localised. Main crops were in many cases destroyed by *Heliothis armigera*, and Capsids and *Helopeltis* sp. caused varying amounts of injury to young flower buds and shoots.

H. C. Ducker & W. L. Miller report from the Domira Bay Station, Nyasaland (pp. 140–147) that the percentage loss from termites was the same on 12 plots on which the influence of various rotations [**31** 32] was tested. The planting of maize before cotton on newly-cleared land is therefore no longer recommended.

E. O. Pearson (pp. 149–159) reports that in the Lower River area of Nyasaland crop analyses indicate that 38 per cent. of the bolls that survived on the plants for a fortnight were destroyed by the red bollworm [*Diparopsis castanea*], 7 per cent. by *Dysdercus*, and 3 per cent. by unknown factors [*cf.* **31** 33]. The phases of activity of *Diparopsis* and the course of infestation by *Dysdercus intermedius* and *D. fasciatus* are described and discussed. Evidence over three years shows that breeding by *Dysdercus* spp. is often very restricted during the cool season, so that very early crops may have almost passed the susceptible stage by the time that injurious populations occur. Late crops on which the bolls mature in the hot, dry season, are also likely to escape damage, since lack of food and the climatic factor prevent the production of large populations during June and July. Where the first crop is partly destroyed by *Diparopsis castanea* and boll-production is extended over a long period, the later crop may be severely damaged by *Dysdercus* as a result of the continuous breeding.

Estimated flight curves for the adults of *Diparopsis* emerging from diapausing pupae, based on records from cages embedded at three different sites, were in good agreement with infestation estimates based on egg counts and crop losses in the field. Experiments were begun in 1941 to determine the mortality among the prepupae and pupae under natural conditions. When fifth-instar larvae were confined for nine days in perforated zinc cylinders that were closed at the top by wire gauze, left open at the bottom, and sunk into the soil to a depth of 4 ins., 68·4 per cent. pupated successfully, 17·1 and 6·4 per cent. were killed by predators or died, respectively, before constructing their cocoons, and 4·5 and 3·6 per cent. after doing so. The commonest predator is the ant, *Myrmicaria eumenoides*, Gerst. Mortality among prepupae did not vary much until the hot season in September and October, when it tended to increase. Of pupae in their cocoons buried in soil at a depth of 1½ ins. and examined weekly or at long intervals, 44·5 and 51·4 per cent., respectively, gave rise to adults, 29·9 and 15·3 per cent. were killed by desiccation or moulds, 20·7 and 20·9 per cent. were eaten by predators and 4·9 and 12·4 per cent. were missing. There was little difference in survival between pupae originating between May and July, inclusive, but mortality due to predators, desiccation and mould increased in those originating in August and rose sharply those originating in September–October. There was little mortality from desiccation until November; since the development of mould on cocoons does not appear to be correlated with wet weather and occurs at the same seasons as desiccation, it is thought to be a secondary, possibly post-mortem, effect. The data suggest that pupae become susceptible to lethal factors only when they start to develop. They do not appear to vary with age in resistance to them or to the factors responsible for breaking diapause.

The results of field experiments made between July 1941 and May 1942 on the incubation of eggs of *Dysdercus intermedius* and *D. fasciatus* agreed with the results of previous laboratory experiments [**27** 491]. Batches of eggs in suitable containers were buried in the soil at depths of 1½ and 3 ins. in permanent bare fallow or a shaded grass plot, or kept in a grass-roofed insectary under atmospheric conditions or at 100 per cent. relative humidity. Hatching was determined mainly by the maximum temperature and ceased when this exceeded 34·5°C. [94·1°F.]. In the bare fallow, the temperature at a depth of 1½ ins. was never lower than 36°C. [96·8°F.], and eggs hatched at a depth of 3 ins. only on the few occasions when the maximum temperature there was below 34·5°C. When kept in the insectary at 100 per cent. humidity, so that temperature was the only variable, no eggs hatched between mid-September and mid-December, when the main rains broke, but hatching then continued throughout the season and the nymphs developed to the second instar. Similar results were obtained with eggs in shaded soil, which were influenced greatly by rainfall, chiefly through its effect on soil temperature, but the first-instar nymphs developed only during the main rains and the early part of the cool, dry season, when conditions of soil moisture were good. No hatching occurred in the insectary under atmospheric conditions except during the main rains, and first-instar nymphs were able to moult only during protracted wet weather.

Observations on *Diparopsis castanea* were continued in the Lake Shore area of Nyasaland and are described by B. I. Mitchell (pp. 159–164). There was again no difference in the behaviour of pupae exposed to humidities of 50, 75 and 100 per cent., and almost equal numbers of adults emerged at each ; eight pupae were still alive at the end of 16 months, when some 2,000 moths had emerged. Contrary to previous experience [**31** 33], there was no difference in the duration of the pupal stage among naked short-term pupae and those in earthen cocoons. During the four or five months between the end of the period of emergence from short-term pupae and late October, however, about 7 per cent. of the pupae in earthen cocoons and between 50 and 80 per cent. of the naked pupae produced adults, the latter continuously. Naked pupae are convenient for laboratory investigations, and an experiment in 1942 showed that their behaviour is identical with that of pupae in cocoons provided that they are kept at constant temperatures.

The emergence of adults from diapausing pupae ceases temporarily towards the end of January ; the adults that emerge prior to this are active before the cotton buds develop and cannot therefore oviposit. When overwintered pupae were submerged in water for three days on a varying number of occasions during the hot season of September-November, those that were submerged most often tended to emerge before, and those that were submerged least often or not at all after, the break in emergence. As it has previously been shown that pupae in diapause do not absorb water or gain in weight during submergence, and that submergence as such does not affect them, these results are regarded as further evidence that long-term pupal diapause is caused by long periods of high temperature, the effect of which is cumulative, and indicate that treatments tending to reduce the soil temperature during the hot months would provide useful control by causing emergence before the end of January.

The mortality among full-fed larvae, prepupae and pupae under semi-natural conditions was determined by the methods employed in the Lower River area. Of the larvae, 25·8 per cent. escaped or were removed by predators, 2·8 per cent. were destroyed shortly after pupation by insect predators, and 4·8 and 1·2 per cent. died from unknown causes as larvae and newly-formed pupae ; the rest (65·4 per cent.) pupated successfully. The mortality and emergence among pupae that were examined weekly and at long intervals followed an identical course. The proportion of pupae that produced adults before the cotton was uprooted in July was nearly as large as the proportion that died during the

same period. Of pupae that were alive after the cotton was uprooted, 4·9 per cent. of those examined weekly and 7·1 per cent. of those examined after long periods survived until the cotton crop of 1942 was available; the latter figure is considered to be a maximum, since some adults emerged before the fruiting of the crop. Rats destroyed 56·8 per cent. of the 1,070 pupae used in the experiment, mostly during the last week of July and the first three weeks of August, after their preferred food was removed by the uprooting of the cotton. Ants and Tenebrionid larvae destroyed 20·6 per cent. of the pupae and were most active between April and July; mould and desiccation, which were lethal only to pupae that were developing, destroyed 6·4 per cent. A large-scale experiment to determine the value in control of digging the fields soon after harvest was begun in 1942. In addition to preventing continuous breeding, this measure should remove the food-supply of predacious mammals, facilitate their foraging expeditions by loosening the soil, and produce steeper temperature gradients below the soil surface, thereby decreasing the number of long-term pupae. In a small-scale laboratory experiment to determine the effect on prepupae of the humidity in the air-spaces of the soil, almost equal numbers of moths emerged at humidities of 75, 85 and 100 per cent.

J. B. Hutchinson, R. A. Silow & S. G. Stephens state in a report of the Cotton Research Station at Trinidad (pp. 168–174) that *Dysdercus, Platyedra gossypiella* and the cotton leaf-worm [*Alabama argillacea*, Hb.] occur in both Jamaica and the Bahamas, and the leaf-blister mite [*Eriophyes gossypii*, Banks] is also present in Jamaica. There is little prospect of developing a successful cotton industry in either Colony unless *Dysdercus* can be controlled or avoided.

CHEN (S. H.). **Flea Beetles collected at Kwangsi.**—*Sinensia* **10** no. 1–6 pp. 20–55. Peipah, 1939. [Recd. 1943.]

In the introduction to this systematic paper, attention is drawn to the occurtence in Kwangsi of two Halticids that are very injurious. These are *Phyllotreta vittata*, F., the adults of which attack cruciferous root crops, cabbage and radish and may completely clear considerable areas of them, and *Clitea metallica*, Chen, which is one of the most serious pests of *Citrus* in China [*cf. R.A.E.*, A **25** 381]. Both adults and larvae of the latter feed on the leaves and tender shoots and sometimes destroy almost all the new leaves on the trees.

ZECK (E. H.). **Pests of dried Fruits.**—*Agric. Gaz. N.S.W.* **54** pt. 2 pp. 67–71, 10 figs. Sydney, 1943.

The author gives brief notes on the appearance and life-histories of the insects that attack dried fruit in Australia [*cf. R.A.E.*, A **17** 239, 267]. The most harmful are *Plodia interpunctella*, Hb., *Oryzaephilus surinamensis*, L., *Ephestia* spp., and *Tribolium* spp.; others that may attack dried fruits are *Carpophilus hemipterus*, L., *Araecerus fasciculatus*, Deg., *Sitodrepa panicea*, L., *Lasioderma serricorne*, F., *Laemophloeus minutus*, Ol., and *Drosophila* spp. Control measures include keeping the places in which food is stored clean and free from accumulations of rubbish and waste products. Ethyl formate is now largely used in dried-fruit packing sheds as a fumigant; it is poured on top of the fruit in each box after packing, immediately before the lid is nailed on, at the rate of 10–14 cc. per 56 lb. box, or applied to fruit in tins at 7–8 cc. per 56 lb. tin, and subsequent applications are made every two months where the fruit is stored. This treatment does not harm the fruit or affect its flavour. Carbon bisulphide can also be used in airtight containers; it is poured at the rate of 5 lb. (approximately $3\frac{1}{8}$ pints) per 1,000 cu. ft. air space into shallow vessels or on to bagging on top of the fruit, which should be thoroughly aired after 24 hours.

CAMPBELL (T. G.). **Introduction of Scale Parasites from California.**—*J. Coun. sci. industr. Res. Aust.* **16** no. 1 pp. 41–42. Melbourne, 1943.

The author records the introduction of the Chinese race of *Comperiella bifasciata*, How., and *Metaphycus helvolus*, Comp., into Australia from California, where they have recently become established as parasites of *Aonidiella aurantii*, Mask. [*cf. R.A.E.*, A **31** 328] and *Saissetia oleae*, Bern. [*cf.* **31** 245], respectively, on *Citrus*. These Encyrtids were successfully transported by air ferry and are now established in the laboratory at Canberra, and arrangements are being made to breed and liberate them in selected *Citrus* areas.

Insect Pests in Saskatchewan.—*Guide Farm Pract. Saskatch. 1942* pp. 60–72, 2 figs. Saskatoon, Sask. [1942.]

A key by which the commoner insect pests of field crops in Saskatchewan may be identified from their appearance or that of the damage they cause is followed by brief notes on the bionomics and control of the most important, which comprise wireworms, cutworms, grasshoppers and the wheat stem sawfly [*Cephus cinctus*, Nort.]. The control of insects attacking farm gardens, shelter belts and orchards is briefly discussed, and suitable measures are shown in tables.

MANNS (T. F.). **Peach Yellows and Little Peach.**—*Bull. Del. agric. Exp. Sta.* no. 236, 50 pp., 15 figs. (3 col.), 33 refs. Newark, Del., 1942.

After a brief survey of earlier work on the subject, a detailed account is given of investigations in Delaware from 1915 to 1941 on the virus diseases, peach yellows and little peach [*Chlorogenus persicae* vars. *vulgaris* and *micropersica* of Holmes], both of which occur in many varieties of plum and are transmitted to peach by the Jassid, *Macropsis trimaculata*, Fitch, and possibly also by *Philaenus leucophthalmus*, L. [*cf. R.A.E.*, A **28** 571, etc.]. Neither disease was disseminated experimentally by honey bees, *Aegeria* (*Conopia*) *exitiosa*, Say, *Conotrachelus nenuphar*, Hbst., *Anuraphis* (*Aphis*) *persicae-niger*, Smith, *Myzus persicae*, Sulz., *Ceresa bubalus*, F., *Magicicada*(*Cicada*) *septendecim*, L., *Gyponana* (*Gypona*) *octolineata* var. *striata*, Burm., *Thelia uhleri*, Stål, *Phlepsius irroratus*, Say, or *Ormenis pruinosa*, Say, and peach yellows was not transmitted by *Lygus pratensis*, L., which was not tested with little peach.

Observations in 1937–41 indicated that the Japanese beetle [*Popillia japonica*, Newm.] prefers peach trees infected with either disease to those that are healthy, infected trees being almost defoliated, whereas adjacent healthy ones were hardly touched.

Brief descriptions of these diseases and of seven other virus diseases of peach that occur in the United States but have not been recorded in Delaware are given in an appendix.

PAPERS NOTICED BY TITLE ONLY.

PERKINS (J. F.). **Preliminary Notes on the Synonymy of the European Species of the *Ephialtes* Complex (Hym.), Ichneumonidae.**—*Ann. Mag. nat. Hist.* (11) **10** no. 64 pp. 249–273, 15 refs. London, 1943.

CARTER (R. H.) & GOODEN (E. L.). **Fluorine Insecticides. A Study of the chemical and physical Properties of commercial Sodium Fluoride and Sodium Fluosilicate in Relation to their insecticidal Use.**—*Soap* **19** no. 3 pp. 99, 101, 117, 3 figs., 5 refs. New York, N.Y., 1943. [See *R.A.E.*, B **31** 173.]

NOTICES.

Secretaries of Societies and Editors of Journals willing to exchange their publications with those of the Institute are requested to communicate with the Director.

The Annual Subscription, *in advance*, to the Review, Series A (Agricultural), is 30s. post free; Series B (Medical and Veterinary), 15s. post free. Subscriptions to the *current* Volume received after 30th June in each year will be charged at the published price *viz.*: Series A, 36s.; Series B, 18s. Prices of Back Volumes on application.

Orders and Subscriptions should be sent to the Director, Imperial Institute of Entomology, 41, Queen's Gate, London, S.W.7, or through a bookseller.

CONTENTS.

CONTENTS—*cont.*

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by the South Essex Recorders, Ltd., Ilford

(1266) Wt. P11/3728 1,500 9/43 S.E.R. Ltd. **Gp. 432.**